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"THE FIELD TELEGRAPH," ITS USE IN WAR AND ITS
EMPLOYMENT IN THE LATE EXPEDITIONS IN THE
SOUDAN AND SOUTH AFRICA.

By Major C. F. C. BERESFORD, R.E.

FROM the very earliest ages attempts have been made to invent rapid and secret methods of communication for the purposes of war. The greatest development in this direction has, however, taken place within the last quarter of a century. The electric telegraph has been surely and rapidly spinning its web round the globe.

Space and time have been practically eliminated from calculations for keeping human enterprises in motion, and as war keeps pace with every other enterprise, each new scientific appliance finds an opening in military organizations.

Mr. Plum, the historian of the telegraphs in the American War, remarks: "Like a few great actors who play all parts well, the telegraph upon the stage of life is successful in every rôle, but like them it has its specialities."

It will be my endeavour to show how many different rôles are open to the military telegraph, and to point out what its specialities are; but before it can have full justice done to its capabilities, the interest and sympathy of every branch of the Service must be enlisted.

In almost all armies the telegraph, in its earliest stages, has been snubbed and neglected, not to say opposed; as a well-known authority on the subject, Herr von Fischer Treuenfeld, observes: "The opposition shown to it by many commanders, as being prejudicial to their independent action, is frequently due to an improper ambition, and to a false conception of strategic principles. The most

important principle of modern warfare, *i.e.*, the union of extended action under a single will, being too frequently overlooked." In the Franco-German War, the German telegraph, though one of the chief elements of their success, was at the outset impeded in every kind of way. No proper transport was provided, the detachments were pushed off the roads to make room for other corps, little or no assistance was given in maintaining the line; the poles themselves were frequently used to feed the bivouac fires.

In the Russo-Turkish War of 1877, during the march from the Caucasus to Asia Minor, the field telegraphs were frequently destroyed by wagons and by soldiers, and the poles used as firewood. On complaint being made to the Army Commander, the only consolation received was, "That it was inadmissible in a woodless region to ask the poor sick soldiers to spare the telegraph poles;" and yet the action of the Army depended on an unbroken line of communication some 750 miles long.

In our Army for some years the Field Telegraph Troop at Aldershot was regarded by many as a harmless amusement provided for Engineer Officers at the expense of the taxpayer, and it was much admired as it marched past in the Long Valley. For all that it was quietly doing good work in training Officers and men, and the result of that training has been fully recognized by Generals who commanded in late expeditions.

The greatest triumph achieved by the telegraphs over prejudice has been in China. The difficulties with the French forced upon the Chinese Government the necessity for, among other things, connecting Canton by telegraph with the borders of Tonquin. The characteristic opposition of the Chinese populace to foreign innovation showed itself at once, and all kinds of means had to be taken by the Government and the Danish Engineers, who were in charge, to circumvent the superstition of the people.

It is told how the following explanation was given to awe the inhabitants.

The telegraph poles were said to be inhabited by devils, and were placed close enough together for the devil in one post to be heard by the devil in the next. The wire was merely for the purpose of keeping the posts upright, as a slanting position made the devil inside feel very uncomfortable. These devils spoke a language only known to foreign devils, one of whom was at each end of the line.

Sketch of the History of the Use of Telegraphs in War.

The honour of introducing the telegraph into war is due to the British Army in the Crimea, when short lines were used for connecting the camp before Sebastopol with the harbour, and the several headquarters with one another.

In 1857 it was again used during the mutiny in India, and Lord Clyde's advanced posts were enabled by its means to communicate with Calcutta. The dryness of the soil permitted long lines of bare wire to be laid on the ground without any insulation, though heavy

dews must have seriously interfered with the working. The telegraph, however, is reported to have done excellent work.

The same year the French had a field telegraph in Algiers, and in 1859 they made considerable use of it during their Italian campaign.

Up to this time telegraphs in war had been merely used to connect headquarters with the base, but in 1859 the Spaniards, under General O'Donnel, took a light equipment with them to Morocco, and made successful use of it for outpost work during their campaign in North Africa. A cable had been laid from Tarifa to Ceuta to keep up communication with Spain.

Since that time the Spaniards have developed their equipment with a view to adapting it to outpost and mountain warfare, and its leading characteristics now are, that it is carried by pack transport and is extremely light and portable.

In 1860-61 the Italians were the first to regulate, by means of the telegraph, the advance of two separate columns marching on the same strategic point, but separated by natural obstacles.

Ancona was held by a body of Irish and Belgians, under the French General Lamoricière, when Victor Emanuel determined to invade the Papal States. Two columns of 10,000 men each, one on either side of the Apennines, were directed against this place. Their combined action was completely successful, and entirely due to a judicious use of the telegraph.

In 1864 the Germans made use of the telegraph in their war with Denmark, and at the assault of Düppel there was a field station established close to the position taken up by Prince Frederick Charles, by means of which he received on the field of battle a congratulatory despatch from the King of Prussia.

The Civil War in America.

Up to 1861 telegraphs had been looked upon by commanders as indeed a useful auxiliary, but also as a luxury of war which time might possibly develop, when suddenly there burst upon the world the civil war in America. Before the beginning of that struggle the Federal States possessed neither a State telegraph system nor a field telegraph corps, only a signal corps used chiefly for surveying purposes on the Indian frontier.

The telegraphs of the country were in the hands of three private companies.

Grasping to the full the possibilities within reach, the Federals unhesitatingly seized all the telegraph appliances and personnel, and made such a thorough and rapid use of them, that in a few months the war may be said to have been entirely conducted by means of the telegraph.

It was used for every conceivable purpose, whether for maintaining communication with the base, or between different bodies of troops on the march, in camp or on the battlefield; for reconnaissances, sieges, and outposts.

At the battle of Fredericksburg, 13th October, 1862, it was extended from the headquarters to either wing, and another line fol-

lowed the first advance when made. The operators were exposed to severe fire, but held their ground. Constant and reliable use was made of the telegraph during the battle.

Throughout Sherman's march his headquarters were daily in communication with the base two hours after halting.

Mr. Plum, who took an active share in the operations, states that frequently he had been in telegraphic communication with Officers while they were fighting to maintain a position, and at one time with an operator inside a stockade which was being attacked, the wire, for some unaccountable reason, not having been cut. He also says: "Battle orders by telegraph became the usual means of moving troops, and that was the main object of the service."

At the battle of Petersburg, 2nd April, 1865, a telegraph station was established 500 feet behind a battery engaged, and remained working throughout. Corps Commanders frequently conducted entire expeditions from the telegraph tent without getting on horse-back.

At the close of the war not only the headquarters of four armies, representing 250,000 men, many miles apart, but the outposts themselves were connected by wire with General Grant's tent in Culpeper. Over 8,000 miles of wire were in use, and more than 1,000 operators had been employed.

There is one point I wish to draw particular attention to, and that is, that at the beginning of the war the Telegraph and Signal Corps were organized as separate services. This system was found unworkable and inconvenient, and after a few months was abandoned, and both were placed under the command of General Stager.

War of 1866.

In 1866 we see how the telegraph can minimize the disadvantages of combined armies operating from divergent bases. The three armies of Prussia advancing on Bohemia were in unbroken communication with each other through Berlin, where General von Moltke held the ribbons in his own hand. The concentration on a single point was timed to a day. The hazardous operation of two armies crossing a mountain barrier at 60 or 70 miles apart to meet a concentrated enemy was stripped of its danger, and Königgrätz was a triumph for the telegraph.

The War in Paraguay.

During the war between Brazil and Paraguay, which lasted from 1864 to 1869, the telegraph was largely used by both sides for tactical purposes. The flank movement by which the Brazilians and their allies forced the Paraguayans from the lines of Angostura and Loma was only rendered possible by the use of the telegraph.

General Lopez endeavoured to direct everything during that campaign by telegraph from his own tent, which I believe was, as a rule, kept well out of fire, while the forward stations during a battle were in the thick of it. His Director of Telegraphs was Herr von Fischer

Trenenfeld, who is now well known, not alone in this country but also in Europe, as the greatest authority on military telegraphs.

The Abyssinian War.

In 1867 England sent out a telegraph detachment to Abyssinia, where about 250 miles of line was run up country, for the purpose of facilitating communication with the base.

Use in Spain.

In 1868, at the suggestion of Marshal Prim, an outpost telegraph system was established in Spain, for the purpose of keeping up communication between the advanced guard of a cavalry division and the main body. It did good service in 1868 at the battle of Alcata, but at a later period was given up, owing to the number of cavalry soldiers required to work it.

Franco-German War.

The Franco-German War of 1870-71 proves that Germany had been well aware of the valuable aid to be sought for from the telegraphs, and had a system carefully elaborated and ready, without which, as her Officers have acknowledged, she would not have dared to invade France as she did.

There were three organizations :—

The Field Telegraphs.
The Etappen Telegraphs.
The State Telegraphs.

The duties carried out by each are clearly explained in a work recently published, "The Organization of the Electric Telegraph in Germany for War Purposes," by Major-General von Chauvin, Director-General of Telegraphs.

Extracts from this work, translated by Captain Hare, R.E., will be found in Nos. CXXVI and CXXVII of the Journal of this Institution.

The network of telegraphs in the Rhine provinces having been organized with a view of converging all the main lines of communication on Berlin, a system for utilizing the French trunk lines running from the frontier towards Paris was then taken in hand; this was the duty of the State telegraph detachments.

Several of the great main parallel lines were selected, those destroyed were repaired, cross lines erected, and centres of telegraph direction arranged as the armies advanced. On the country being occupied, civil government centres were established and telegraphic communication adapted to them. At the close of the war a vast network of State telegraphs in complete working order covered the country.

The State telegraphs not being able to keep pace with the advance of the various headquarters, these were connected with each other in the first place by the field telegraph detachments, whose lines were after-

wards relieved by etappen lines; the field telegraph being thus free for work at the front.

The field telegraph detachments kept up communication with all portions of the armies on the march, using the lines of the country where available, and where not so available, building light temporary lines to be replaced later on by the etappen detachments. General von Chauvin says: "The line was laid quickest when the telegraph detachments accompanied the advanced guards, very often these even preceded the most advanced troops, accompanied by special covering parties. In such cases it happened more than once that the telegraph stations were actually exposed to fire, and sometimes had to retire before the advancing foe."

At sieges the invested places were immediately surrounded by a network of lines; thus at Paris a complete system connected the besiegers' posts, having its telegraphic centre at Versailles.

The telegraph was used for the defence of positions, as at Lisaine by the XIVth Army Corps, where the most important points of the position were connected to headquarters, and the orders and reports transmitted by wire contributed in no small degree to the victory of the defenders.

According to Von Chauvin, it had been clearly recognized in Germany, before the war, that the telegraph could be used on the battlefield itself; but there were no telegraph troops who had been trained in peace-time for the purpose, and it was only the want of such prevented the tactical use of telegraphs on many occasions when they would have been of value.

Even now Germany has no telegraph corps in peace-time, though the want is recognized, and I believe steps will shortly be taken to meet the deficiency.

On this point Von Chauvin says: "The experiences of the Franco-German War have distinctly shown the necessity of a telegraph corps, but the question of expense limits its size to what is only necessary, that is to say, it must only be sufficiently large to enable to be trained in peace the Officers and men required for the field and etappen telegraph detachments in war."

England has got over this difficulty of expense by utilizing a military telegraph division in maintaining a portion of the State telegraphs during peace, thus throwing no expense whatever on the State, and at the same time training a large body of Officers and men.

Ashantee Expedition.

The next occasion we see telegraphs in the field was in Ashantee. A detachment of Royal Engineers from the companies employed in maintaining State telegraphs was sent out under Lieutenant Jekyll. They put up a line 110 miles in length, to a point 20 miles beyond the Prah.

French Regulations.

In 1876 the French took up the question of field and outpost telegraphs, and regulations for field and outpost telegraph sections were

introduced into their Army. A detachment, consisting of 18 mounted telegraphists, 12 of whom were to be Officers, was also arranged for each cavalry division.

Sounders were to be the instruments used.

The duties as laid down were—

1. To connect the Army headquarters with the staff and divisional headquarters, and to extend this connection to the working units.
2. To connect the various headquarters of Army Corps with those of bodies of troops told off for special services, as reconnaissances, outposts, &c.
3. To remove or destroy existing telegraph lines.

Russo-Turkish War, 1877.

Russia followed the example of France, and also organized cavalry telegraph detachments for outpost work.

In the Russo-Turkish War of 1877 the Turks had no military telegraph or signalling corps. Certain existing lines were worked, and extended under civilian employes; but no tactical use was made of them.

On the other hand the Russians, with a purely military organization, employed them freely, and the success of one of their most brilliant operations was secured by an intelligent use of the telegraph.

In October, 1877, the Russians, advancing from the Caucasus under the Grand Duke Michael, decided to cut off the Turks from Kars and Erzeroum. This was to be accomplished by a turning movement, to cut the lines of communication of Muktar Pasha (who commanded the Turks), while he was to be attacked in front by the rest of the Russian Army.

All depended on co-operation at the right moment.

General Lazareff was detached with 27 battalions, 40 guns, and 6 regiments of cavalry, to execute the flank march of 40 miles. On the 13th he had thrown himself across Muktar Pasha's communications, but was threatened by a superior force despatched under Reshid Pasha against him. Lazareff had, however, been accompanied by a field telegraph, and wired the state of affairs to the Grand Duke. The despatch was received by the latter at 3 A.M. on the 14th. On the 17th the Turks were simultaneously attacked on both sides and crushed.

The telegraph was used during the march for reconnaissances, and also during the battle itself. It was guarded by Cossacks, and was only broken down for two hours during the entire operation.

The fate of the campaign in Armenia had hung on a single wire.

Zulu War.

The Zulu campaign in 1879 was the first expedition in which the mounted telegraph troop of our Army took part. After Isandhlwana Lord Chelmsford asked for a field telegraph; up to that he had none. C Troop went out under the command of Major Hamilton, R.E.,

but with only 30 miles of wire and cable. A branch line from the existing colonial lines was run from Ladysmith to Dundee and Landsman's Drift; but the material was then run out, and further operations were carried out by the C troop and other regimental signallers with complete success. Another detachment landed at Port Durnford soon after the battle of Ulundi, with 100 more miles of wire. A line was run from that point to within 10 miles of Ulundi.

Later on, when some troops were stationed in the Transvaal, a line was run to connect Wakkerstroom and Utrecht.

Transvaal War.

In 1881 a combined section (under the new organization) from the Postal Telegraph R.E. Companies, and from C Troop, was made up and despatched to Natal under Lieutenant Bagnold. They arrived at Newcastle towards the end of May, and soon afterwards laid a line to Pretoria, which proved of great value during the negotiations which preceded the Convention with the Boers.

Egyptian Campaign of 1882.

In 1882 the field telegraph section did not arrive at Ismaïlia until a week after the whole of the troops were in Egypt and engagements had been fought. Before their arrival Lieutenant-Colonel Salmond, R.E., had to make the best he could of what he found in the country in the way of lines and operators. On the arrival of Sir Arthur Mackworth, R.E., with the sections, their first task was to repair the existing lines as quickly as possible, and then to push on to the front.

One Officer and a small party of mounted telegraphers were attached to the cavalry division to accompany any raids or reconnaissances.

On the 8th September Sir A. Mackworth with a detachment accompanied Sir Gerald Graham's reconnaissance, paying out $3\frac{1}{2}$ miles of cable. Previous to retiring before the enemy, who appeared in considerable force, two messages were sent through to Kassassin. The cable was left on the ground, but most of it recovered afterwards. The instruments used were Theilers, or vibrating sounders with telephones.

On the 9th the enemy attacked from Tel-el-Kebir, and the camp of the telegraph was for some minutes exposed to a hot shell fire. During this a party of telegraphers were steadily working in a tent round which the shells were bursting, and which was hit more than once by the fragments. Several messages were sent with coolness and precision, among others one which brought up the Brigade of Guards and the Headquarters Staff.

At 7 p.m. on the 12th a cable line was commenced to accompany the advance on Tel-el-Kebir, arrangements were made to follow it up by an overhead wire if necessary, and also for repairing the railway lines towards Tel-el-Kebir.

On arriving at a point a mile in front of the outposts, a halt was made to await the infantry.

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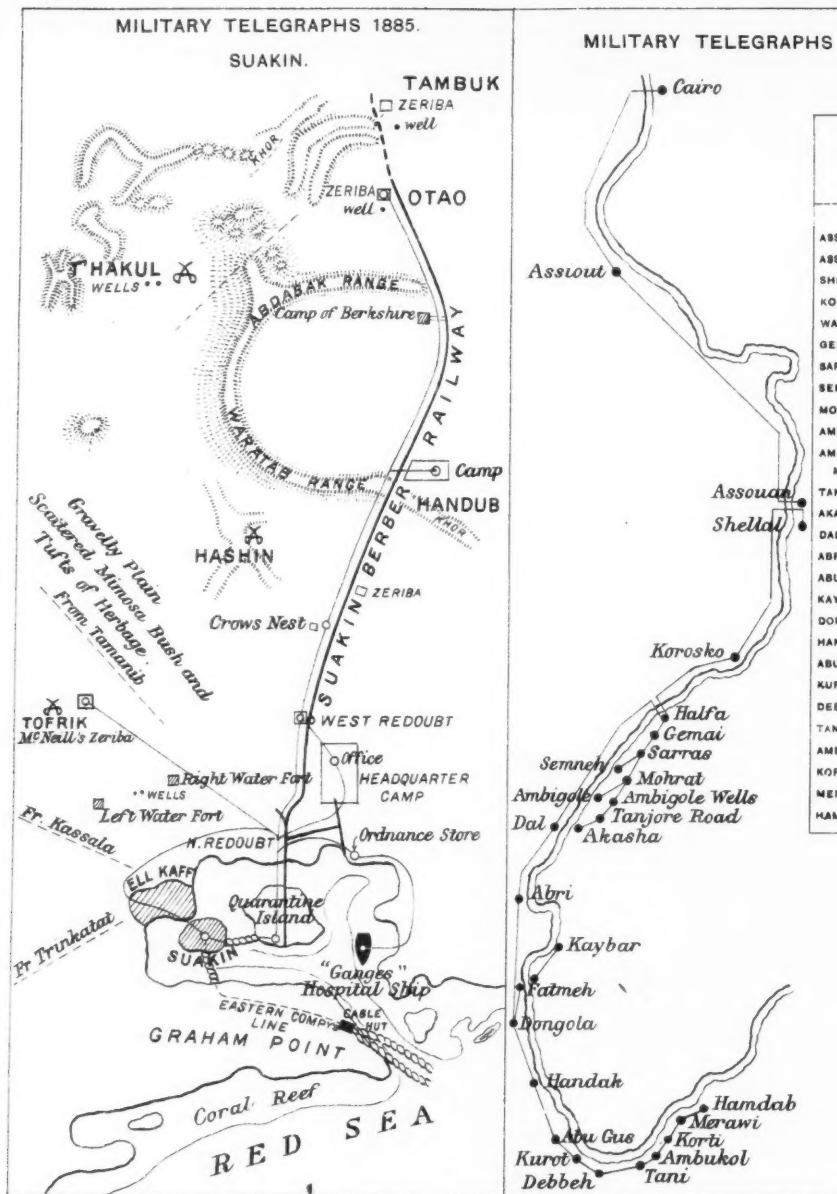
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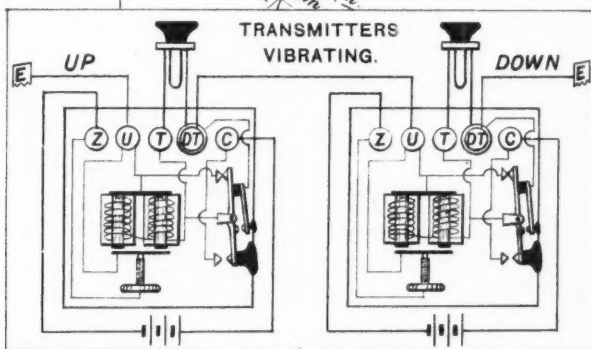


TELEGRAPHS NILE EXPEDITION.

FIELD TELEGRAPH IN BECHUANALAND 1884-5.

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TABLE OF DISTANCES FROM CAIRO.		DISTANCES BETWEEN STATIONS.		DISTANCES FROM CAIRO.
		MILES.	MILES.	
ASSIOUT	...	240	240	
ASSOUAN	...	380	620	
SHELLAL	...	6	626	
KOROSKO (FROM ASSOUAN)	...	110	730	
WADY HALFA	...	100	830	
GEMAI	...	16	846	
SARRAS	...	17	863	
SEMNEH	...	9	872	
MOHRAT (FROM SARRAS)	...	20	883	
AMBIGOLE	...	83	901	
AMBIGOLE WELLS (FROM MOHRAT)	...	12	895	
TANJORE ROAD	...	8	903	
AKASHA	...	10	913	
DAL (FROM HALFA)	...	100	930	
ABRI	...	25	955	
ABU FATMEH	...	94	1089	
KAYBAR	...	24		
DONGOLA (FROM FATMEH)	...	37	1076	
HANDAK	...	30	1126	
ABU GUB	...	33	1159	
KUROT	...	13	1172	
DEBBEH	...	4	1176	
TANI	...	40	1216	
AMBUKOL	...	8	1220	
KORTI	...	4	1224	
MERAWI	...	30	1254	
HAMDAS	...	20	1274	



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Just at midnight Lord Wolseley came up, and sent a message through to Sir H. McPherson. At 2 A.M. another move forward was made.

During the action which ensued, the telegraph was present throughout, and came under fire.

Immediately afterwards it was ordered to join up to the railway station 3 miles off. This was accomplished, and communication established with Kassassin by 8 A.M., the 3 miles of cable being laid in half an hour.

At 8.30 A.M. Lord Wolseley's messages to the Queen and War Minister were despatched. At 9.15 Her Majesty's reply was received.

The instrument used was the vibrating sounder and telephone.

A telegraph detachment now proceeded to Cairo with the foremost troops, and without delay put the whole telegraph system of the country in working order.

The field telegraph was used to a large extent in the three expeditions which took place during 1884-85. The lines, however, were all etappen lines, except in one instance, when a wire for a tactical purpose was run in the Eastern Soudan.

Nile Expedition, 1884-85.

On the Nile the great difficulties to contend against were the unparalleled length of the line of communication, and the restricted amount of transport. We must all regret that it was not practicable to send a line across the Bayuda Desert with Sir Herbert Stewart's column, such an exploit would have been unequalled in the annals of the field telegraph.

One most valuable point as regards the feature of outpost telegraphy was brought out by the satisfactory working of bare wire laid on the ground and joined up with vibrating sounders. I hope that some of the Officers who were on the Nile will give us some further account of what was done.

Bechuanaland Expedition.

In Bechuanaland a line of some 350 miles in length was run to keep the headquarters in communication with the Colonial telegraph system and with the various intermediate stations. The working of this line was admirable. At one time, for a period of nineteen days there was not a single fault or breakdown of any description.

Expedition to Suakin.

In February, 1885, a field telegraph section of two Officers and sixty non-commissioned officers and men was organized to accompany Sir Gerald Graham's force to Suakin. It landed at this place on the 7th March.

Light lines were immediately erected from the headquarter camp to Suakin and Quarantine Island, also other short lines to connect the various departmental depôts in Quarantine Island.

On the 21st March a light overhead line was run out into the

desert from H Redoubt as far as it was safe to do so. This was to facilitate the operations arranged for the following day during the advance of Sir John McNeill towards Tamai.

On the 22nd a telegraph detachment under Lieutenant Lindsay, R.E., accompanied Sir John McNeill's force, and, marching with one of the squares, laid out cable from the end of the line erected the previous day.

5 $\frac{3}{4}$ miles had been paid out when the halt was ordered, and the General wired back his reasons for not going on to the place previously arranged upon for a zareba. This was about 11 A.M. to 12 noon. One or two messages passed between him and the Chief of the Staff.

Zarebas were now commenced; at 1 P.M. the telegraph instrument was moved from the open into one of them, and stood on some empty ammunition boxes.

At 1.40 P.M. Major Turner, Director of Telegraphs, wired to the C.R.E.: "We have kept up communication so far with perfect success."

At about 2.45 the enemy attacked: the telegraph instrument got knocked over by the rush of men into the zareba; but, when the worst of the storm had blown over, a new instrument was at once joined up. Meanwhile, the telegraph detachment had been assisting to defend the zareba into which, at one time, some Arabs had actually penetrated.

At 3.25 P.M. the General sent his despatch to the Chief of the Staff by wire. This message allayed the great anxiety felt in camp, and stopped reinforcements coming out.

Two press messages, one for the "Times," and the other for the "Daily News," were immediately handed in by the special correspondents. While sending these, the clerk in charge had several times to leave his instrument to assist in the defence, as it appeared from time to time that the enemy would renew the assault.

During the afternoon between twenty and thirty messages were sent and received, several passing between General McNeill and the headquarters.

At 7 P.M. the line was cut, and signallers took up the running with lamps to the Right Water Fort.

After this the duty of the telegraph section was to keep up and extend the communication between headquarters and advanced brigades, and also orders were given to work the railway traffic.

Another section landed on the 21st April.

The telegraph was now only pushed to the front so as to keep pace with the railway, and the furthest point reached was Otao, about 20 miles from Suakin. The great difficulties we had to contend against in the maintenance were the climate, the Hadendoahs, and the camels. The first affected the men to a serious extent, especially as the work at the outset, and indeed throughout, was laborious and carried on without intermission during the day under a tropical sun. Loss of physical energy, when energy is everything as in maintaining telegraphs, is a matter the serious nature of which can only be appre-

ciated by those who have had to force work out of men in a bad climate when the excitement is over and reaction has set in.

The Hadendoabs were most active in destroying the line by night, and caused endless work and annoyance. But they hardly did more damage than the camels. At Suakin, the force being concentrated, a huge number of animals were constantly crossing and re-crossing the lie of the telegraph line, and treating the latter with the greatest disrespect.

When the telegraph was broken down the signallers took up the running, but, for reasons which I will touch upon later on, signalling, though a valuable assistance, did not adequately fill the gap.

The affair at To Frik was the first occasion on record (as far as I know) of the telegraph having been in the centre of a fight when it had come to the cold steel period, and enemy were lying where they fell within 2 or 3 yards of the instrument.

The presence of the telegraph on this occasion, I believe, was due to the representations of Colonel Edwards, C.R.E.

Had the expedition been persevered in, this telegraph would have borne a very important part, and the personnel would have required very large reinforcements. How this would have been done is not very clear, as the three simultaneous expeditions had drained the home resources as regards men, and not only that, but a certain strain was felt by the State telegraphs, which had despatched so many Royal Engineers to the seats of war.

It is to be regretted that the absence of proper cable at first prevented light lines from having been run to the extreme points reached by our troops. The cable used at To Frik was outpost cable, totally unfit for the purpose of such a length of line, as being far too delicate and easily broken. The marvel is, it stood as long as it did.

It is the departments of an army who use the wires to the greatest extent; on one day, at Quarantine Island, 800 messages, the majority to or from the departmental offices, passed through two instruments. This beats most records on key speed circuits in the busiest offices in England, and requires the very best clerks to deal with it.

Indian Telegraphs.

In India the telegraph is on a different footing. There is a small nucleus of sappers and miners who form a military telegraph detachment. But on all expeditions they are largely supplemented by the civilian State telegraph employés.

Field telegraphs in the shape of etappen lines have been used in all the expeditions which have taken place of late years in that country. But we have no record of their tactical employment.

Uses of the Telegraph in the Field.

It is scarcely necessary for me, in these advanced days of military science, to dwell upon the uses of the telegraph for war. As I have stated before, it minimizes to the utmost the factors of time and space in dealing with questions of communication; and how far it is

desirable to do this, rests with those responsible for the conduct of an expedition.

All we of the telegraph can do is to provide the messenger that exclaims—

"I fly with the lightning of Heaven,
I travel unseen and unread;
A word, and the impulse is given,
A touch, and the message is sped."

Rapidity is the soul of war. "That which is done quickly is done twice," is a proposition never so certain of demonstration as in the active operations of war.

It has now been clearly established in every army that no extended operations can be carried on without the telegraph, and before long it will be equally recognized that its presence is as necessary to every part of an army as nerves are to a living body.

Some of the ways in which this messenger can be usefully employed may be enumerated as follows:—

- Keeping up communication with the base.
- Regulating the supplies to troops in the field.
- Arranging for reinforcements.
- Arranging for disposal of sick.
- Arranging for disposal of prisoners.
- Keeping up communication between headquarters of armies, Army Corps, Divisions, brigades, &c.
- Controlling the march of columns for strategic purposes.
- Rendering concerted action more certain.
- Regulating railway traffic.
- Obtaining intelligence from the front.
- Concentrating troops for attack or defence.
- Giving orders and necessary reports on the field of battle.
- Investing fortresses.
- Concentrating to repel sorties or make assaults.
- Regulating combined artillery action.
- Defence of fortresses, positions, &c.
- Defence of coasts.

And in many other ways which will easily suggest themselves.

I would direct your notice to a very valuable paper read by Major (now Major-General) Webber, R.E., before this Institution on the 31st March, 1879, and entitled "Orders in the Field, and the Means of Communicating them."¹ The portion of the paper relating to telegraphs would be read with advantage by all those interested in the subject.

One great feature in the use of the telegraph as a channel for orders is, that it enables a commander to qualify, rescind, or enlarge an original order at once, and without risk of misconception. Those who have much to do with giving orders for the execution of important work know the folly of giving verbal orders; the man you give

¹ See Journal, vol. xxiii, page 631, *et seq.*

it to, in nine cases out of ten, is only partially listening to what you are saying, and, even if he does listen, frequently does not grasp the full meaning. No practical man gives verbal orders.

But with a written order it very frequently arises that a change in the order appears desirable after the messenger has gone. The telegraph gets over all these difficulties.

That it has a great tactical future before it cannot be doubted. Von Chauvin says: "There seems to be no doubt, both from our own experience, as well as from the experience of others in war, that the main point is to improve and increase what may be called the use of the telegraph for tactical purposes."

Outpost Telegraphs.

The necessity for having an outpost organization is recognized in England inasmuch as the equipment has been prepared; but here it stops, no steps have as yet been taken to accustom Officers and men of infantry and cavalry regiments to work with it.

It would be impossible to lay down hard and fast lines for its use, just as it is impossible to lay down hard and fast rules for outposts themselves. All that could be done would be to put a valuable aid to communication into the hands of regiments, and the Officers commanding would soon find out how to use them to best effect.

The proposition I put forward is to give all regiments, cavalry and infantry, a small telegraph equipment which would be at the disposal of the Commanding Officer for such operations as he thought fit, and the combined regimental telegraph would be at the disposal of the Officer commanding the brigade or Division. To work these regimental telegraphs, men of the same high proficiency as are required for army telegraphs would not be necessary, but it would be desirable that they should be trained in the same school.

Signalling is not always applicable for outpost work. Its success depends on weather and the physical features of the country, and its action is readily detected by an enemy.

It is sometimes asked, "Can the telegraph be used in the line of outposts?" The answer I would give is—"Anything that is worth doing can be done."

The opposing armies in Paraguay frequently used it; but it is true that the slowness of their movements facilitated its operation.

That it can be used to advantage in the fighting line has been frequently illustrated. In the American War, on the 27th June, 1862, a telegraphist named Burnell established a station 300 feet behind the fighting line of General Porter at Gaine's Mill, and worked without interruption to the reserves and to General McClellan. Burnell was for hours exposed to the enemy's bullets, only protected by a tree. He took the messages on a sounder.

In a reconnaissance of the town of Farnington a troop of cavalry under a Captain Smith set up, under a telegraphist called Parsons, about 4 miles of wire. The troop was attacked and partially captured, Parsons telegraphed under fire, while slowly retreating with

the remnant of the troop, by connecting up his instrument from time to time.

Signalling.

As it now exists the signalling is a distinct organization from the army telegraphs in the British Army. The signalling service has two principal rôles to play. The first comprises all communication in the field for minor purposes. The second in connection with army telegraphs, which it has to supplement, and under certain circumstances to replace.

Before the telegraph is laid signalling does the work ; if the wires are broken down it bridges the fault till repaired ; it forms branches and prolongations when it is not considered necessary to run lines for the purpose ; and in many other ways it is an auxiliary.

Signalling accordingly might be split up into two distinct branches :

1. Regimental signallers trained as at present.
2. Signallers to be part and parcel of the telegraph battalion.

The present signallers, that is, the non-commissioned officers and men, though they are as well trained and as expert with their flags and mirrors as could be desired, are nevertheless not possessed of sufficient education to enable them to work the traffic on a busy telegraph circuit, or in conjunction with a telegraph office.

To deal with the heavy traffic of a telegraph office requires a man who is not only a good manipulator, but who has had a fair education, and a long training in a post office. No one else can do it satisfactorily.

This is especially necessary for war, because the telegraphic traffic is greater in some respects than in civil life, and in the midst of disturbing elements a man is required who, being perfectly at home at his work, is not liable to lose his head.

Signalling from its nature can never keep pace with the telegraphs, but also, as it now exists, it cannot, in the event of telegraph lines breaking down or being in need of extension, take up the running as it should do. The lines become clogged with messages, the signaller from want of practice in telegraphic traffic and from want of higher education is unable to deal with it.

The telegraph clerks now used in the field are among the best that the Post Office can produce, and are men of very considerable education.

There is now a system by which Post Office Volunteers can join the colours for service in the field, and very valuable service they can render as telegraphists ; this I can personally vouch for. The same system, I believe, is to be extended for the signalling service, but the men should be telegraph clerks.

A telegraph clerk can pick up signalling very rapidly.

Seeing the disadvantages of two services which have to work together being under distinct organization and commands, my proposal would be that the signalling service of the Army should be attached to the telegraph battalion, and the non-commissioned officers and men

should be trained telegraphists; that the Officers, artillery, cavalry, and infantry, should be trained in telegraphy as well as in signalling.

The Americans found in their civil war that they were obliged to amalgamate the Signal and Telegraph Corps, and I think we would find the same in any prolonged operations.

Telegraphs for Artillery.

I would bring to the notice of artillery Officers a proposition for using the field telegraph for artillery tactics.

The question of concentrating artillery fire on particular points during an action has often been discussed. It may be desirable to concentrate the fire of a very large number of guns on some one object. The position may be such that these guns, occupying a very extended front, render unity of action difficult. Would not the telegraph sometimes be of service on such an occasion to concentrate and control the fire without concentrating the guns?

It might also be used for range-finding, as is done in Germany.

Organization.

In some foreign armies telegraphs are classed as—

Field telegraphs.

Etappen „

State „

The field telegraph comprises all advanced and temporary lines, whether for tactical purposes or for connecting various headquarters.

Etappen lines are for connecting the headquarters with the base, and the various points for concentration, or advanced bases on the lines of communication.

State telegraphs are heavy permanent lines for carrying, not only the war traffic, but also all the ordinary traffic of a country.

Then the etappen are the connecting links between the field and the State telegraphs.

In our expeditions we have never, except in Egypt, as yet had to deal with State telegraphs, and in fact what we have done comes under the heading of field telegraphy, as above.

To the three classes mentioned I propose for consideration a fourth, *i.e.*, regimental telegraphs. These would no doubt be a branch of field telegraphs, but would be on a different footing. All regiments, cavalry and infantry, might be provided with a small telegraph equipment, to be used for outpost purposes and for connecting themselves with headquarters in camp. Whether the instruments should be telephones or not is a matter of detail or of experiment.

As regards intercommunication in camp, it would be a simple matter to organize a telephone exchange at the headquarters in many large camps an hour after it was pitched, each regiment to lay and maintain its own line of cable. The number of orderlies saved would far more than compensate for any expense.

Regimental telegraphers, though they should be trained by the

telegraph battalion, would not be under the Director of Telegraphs in the field, whose province is only with the lines for army communication.

Present Organization in the British Army.

As most of you are aware, there is now in our Army a telegraph battalion of two divisions. All the telegraph service in the field is performed by them.

In peace-time, one division with wagons and horses is stationed at Aldershot, and trains Officers and men for field telegraph.

The other division maintains, under the Engineer-in-Chief to the General Post Office, all the State telegraphs in the south of England and Channel Islands.

For war purposes, sections of about fifty men are formed, a certain proportion from each division.

The system has shown itself an admirable one, and the most economical a State could maintain. But in matters of this kind, we must look forward to what is likely to be demanded in the future, and not measure our requirements by the past alone.

The uses made of the telegraph for war increase at a startling rate, and will increase as its powers become more recognized. In years to come, it will be considered as great an anomaly to send a body of troops on any detached duty in the field without its connecting telegraph line, as it would be to send a man who was dumb as a Member to the House of Commons.

What we have to consider, then, is how to extend the training which is necessary for signallers and telegraphers in every branch of the Service.

It is evident that no extra strain should ever be put on the State telegraphs in England by withdrawing too great a proportion of men employed on them for foreign service; but with the present strength of the battalion this is inevitable. The only way to meet the difficulty is to increase to a very considerable extent the Officers and men under training.

Training.

Though the duties in the field may look simple, it nevertheless requires a long and careful technical training to give a man the requisite qualities.

A telegraph lineman in war or peace has far more responsibilities, and has to exercise his judgment and forethought to a far greater degree than falls to the lot of many an Officer in Her Majesty's Service. To train a man to the required point can only be done by a combination of instruction in State and in Field Telegraphy; and to train non-commissioned officers for the positions of great responsibility which may fall to them, can only be done in schools such as the State telegraphs, where responsibility and emergency are their daily portions. Results justify this opinion.

And I may here remark that none but non-commissioned officers of superior education should be chosen.

The maintenance of telegraphs admits of no hesitation, no mistakes, and no fear of responsibility.

As regards the training of Officers, a deep scientific knowledge of electricity is not necessary, but it is necessary that they should know enough to be able to follow and utilize for war purposes the improvements that are daily being brought out in the art of telegraphy, and every Officer should be able to teach his men in all their duties, and in addition to this, should be accustomed to deal with large questions of organization.

In the field, a good organization for working what is a very complex piece of machinery is a *sine quâ non*.

Though the telegraphs have had such great success in our Army, and the organization (thanks to our predecessors in the work) is undoubtedly the best in any European army, and is recognized as such, I would point out the danger of resting on our oars, satisfied with past successes. What we have hitherto done in war has only been the simplest kind of field telegraph work. We have only run single etappen lines from the base to the front; these have been only single lines of communication, and no complicated problems for the telegraph. It will be different if at any time we take part in an expedition into a European country, where the advance may be by several main roads, and cross communications and numerous branches necessary; when the telegraphs of the country will have to be taken over, and worked, not for military purposes alone, but also for the civil government of the country. Instruments of a far more complicated nature than those for field use would become necessary, and such an organization indispensable, that could only be worked by Officers and men who had undergone a long training in peace. Our present organization has been equal to what has as yet been required of it; but to provide a trained personnel for a more extended field of action, such as I have sketched, would be beyond what it could do without unduly straining the State telegraphs at home.

In conclusion, I would say, that whatever organizations may exist, our duty as telegraph engineers is to be ready at all points to show that the motto for the telegraph is, "Ubique."

Herr von FISCHER TREUFELD: Major Beresford has mentioned my name in such flattering terms that I am hardly in a position to know how to thank him for such distinction. There is one thing I can say with certainty, viz., that every telegraph Officer, not only English, but of any army, must feel very much indebted to the lecturer for having brought before this meeting the subject of strategical and tactical telegraphy. We all know very well that not many years ago, say ten or twelve at the utmost, very little was known about military telegraphy. The general knowledge as to the formation, the organization, the personnel, and the matériel of military telegraphs was indeed very limited. Thanks to the literature of late years and to the valuable papers read by various Officers, and especially English, this early condition of semi-ignorance has passed away, and we are now very well acquainted with the formation, the organization, the personnel, and the matériel used by other armies in Europe and elsewhere. But I would ask, have we an equally good knowledge relating to the sphere of action which a military telegraph ought to have in the army? I mean as regards participating in the operations of war. As to these matters there is an immense difference of opinion, and I

maintain that we are very far from having clear ideas on these points, and therefore think that it has been very timely and opportune of Major Beresford to bring this subject before the meeting. If we take a glance over the various organizations of military telegraphy, we shall find that some countries have an organization which only allows telegraphic connection from the base of operations with the headquarters of armies, not even including the headquarters of army corps. There are others which have such an organization that they extend their telegraphic communication beyond the divisions and brigades to the very outposts, or even, as for instance, the French and the Russians, behind the outposts in the form of cavalry telegraphs for reconnoitring purposes. Major Beresford states that in the year 1876 the French took up the question of field and outpost telegraphs, and regulations for field and outpost telegraph sections were introduced into their Army. The duties as laid down were—"First: to connect the army headquarters with the staff and divisional headquarters, and to extend this connection to the working units. Secondly: to connect the various headquarters of army corps with those of bodies of troops told off for special services as reconnaissance, outposts, &c." This is an organization which goes very far in tactical telegraphy, but if we compare another European Army, equally anxious to arrive at perfection, namely, the German, we find that quite different opinions are held. There the official *règlement* prescribes the task of field telegraphy, to maintain an uninterrupted telegraphic communication from the base of operation, to the great headquarters, and thence to the headquarters of the armies in the field, the telegraph not extending to the army corps, but to such corps which are operating independently. The connection between an army headquarters and an army corps is only admitted under exceptional and favourable circumstances. But here stops the programme of German field telegraphy! I should like to impress still more upon you this difference of opinion with regard to strategical and tactical use of the telegraph by a few figures. First, allow me to draw your attention to the difference of formation with respect to the number of telegraphic sections for each army corps. Of course the section might be of different strengths, say fifty, eighty, or more men, but let us take the section as the unit in this present general comparison. There are some armies in Europe which have no telegraphic sections at all—Turkey, Portugal, and Greece. I believe Portugal is going to have an organization, because they have had a Director of Military Telegraphs for several years. Then, and this is a striking thing, comes Germany, which shows that in Germany the opinion in favour of the extensive use of telegraphs is very limited, that is to say, the telegraph is concentrated within the sphere of the principal headquarters and not beyond them. In the Franco-German War the Germans had twelve telegraph sections for fifteen army corps, equal to four sections to five army corps. After the war this low proportion, through an increase of army corps without a corresponding increase of telegraphic sections, became still smaller, and the German Army has now only four telegraph sections to six army corps. We have then Belgium, Holland, Sweden, and Spain having each one telegraph section for one army corps. Then comes France, which in accordance with the new organization of 1884, possesses field sections, telegraph parks, etappen sections, and railway telegraph sections, and taking all these together they have two telegraph sections for one army corps, or nearly so. Then comes Switzerland, with two telegraph sections for one army corps; then Italy with nine telegraph sections each of one hundred and nine men, and which are so divided that there are two sections for one army corps; then Russia has three telegraph sections for one army corps; Austria has fifty-two telegraph sections in the proportion of three sections for one army corps; and last, or rather foremost, comes the English Telegraph Battalion, which has eight sections for two army corps, or in the proportion of four sections to one army corps. These numbers show that there is certainly a great variety of opinion with regard to organization and with respect to strategical and tactical co-operation of the field telegraph. There is another point upon which, with your kind permission, I would bring a few figures before you, in order to show the very vast difference in the opinion of army telegraph authorities, namely, the proportion between insulated cable and naked wire that is prescribed by the army equipment and carried by

each field telegraph section. We may say that the naked wire erected on poles represents the strategical element, because that is a line which can only be slowly erected, and it requires more transport, and therefore is kept more at the rear than the light cable which requires less transport, and can be more readily led out towards the front. I should, therefore, say that on the other hand the field cable represents the tactical element of an army telegraph system. A comparison of the proportions carried by each army of these two would give an idea of the views of the different armies with regard to the strategical or tactical sphere of action for their military telegraphs. Commencing again from the lowest proportion, we find that Sweden uses very little cable, only about one-sixth cable to one of naked wire. Then Denmark has about the same proportion—one-fifth of insulated cable to one of naked wire. I would say that these armies do not use cable because they dislike to use any articles of war which they cannot manufacture in their own country, so that strictly speaking they are not opposed to the use of cable except for that reason. Then there is Russia, whose use of cable in respect to naked wire is as one-fourth to one; of course Russia will always have to rely more upon naked wire than upon cables, owing to the enormous distances they have to cover. Then comes Germany, in which the use of field cable is also limited. The proportion between cable and naked wire in Germany is with regard to the field sections 0·7 to 1, but of course in the *etappe* telegraph sections the proportion is very low, namely, 0·1 to 1. In Italy the proportion is 0·7 to 1. In England the proportion is 0·8 of cable to 1 of aerial line. In Holland it is 1·3 of cable to 1 of aerial line; in Austria 2·1 of cable to 1 of aerial line. Then we come to France, which after the Franco-German War has given the preference to cable. Thus after the organization of 1874 the French Army possessed 19 field telegraph and 14 *etappe* sections. All these sections had five times as much cable as aerial wire, so that the proportion was 5 to 1. According to the new organization of the 16th March, 1884, the proportion between cable and aerial wire is for the field sections 3·6 to 1, for the telegraph parks 4·6 to 1, and for the reserve parks 8·3 of cable to 1 of aerial wire. So you see that France has a far greater abundance of cable than Germany and England. Then comes Spain, which has no aerial wire at all; the Spanish telegraphs being entirely based on cable communication. All cable and other materials being packed and carried on mule-back, the Spanish Army possesses the most movable field telegraph, well adapted for tactical operations. The above figures show that a vast difference of opinion exists with regard to the question under discussion, and compared with former years those figures prove the importance which cable-lines have attained, and that their *rôle* is becoming more and more extended. As the field cable represents the tactical element of the army telegraph, and supposing it is wanted to increase the sphere of action of an army telegraph towards the front, the principal thing to be done for attaining such an end is, to improve the field cable; that is to say, to make such cable stronger and lighter. It is the question of transport, and that alone, which puts a limit to its being brought to the front in a great war, as for instance with the English field cable, which the late Director of Austrian Field Telegraphs, Ritter von Klar, and I devised in 1875, for the Austrian Army, and which has now been adopted by nearly all European Armies, it would require at least ten cable-wagons and sixty to seventy horses to connect one single advancing army headquarters with three army corps, not including any connections to any division. The weight of the field cable being the principal hindrance in advancing telegraphic communication towards the front, I recommended fourteen months ago to improve the present field cable, and Messrs. Siemens Bros. and Co., of London, have constructed since then a number of such cables, some of which were submitted to the Royal Engineers many months ago. I have now the pleasure of laying before you a small length of such cable, which I believe will give very great advantages to field telegraphy, because the conditions of that cable are much more favourable to transport and strength than those of any cable hitherto used. The cable now in use in the English Army, which is called No. D. 5, has a diameter of 6 millimetres, whereas the new cable has a diameter of less than 4 millimetres; the weight of the old cable is 170 lbs. per statute mile, as against 105 lbs. for the new cable of the same length. The breaking strain of the old cable, the D. 5, is 250 lbs., and of the new cable 500 lbs., so that the old cable is 62 per

cent. heavier than the new one, and, besides, the latter has double the breaking strain. The result being that 8 miles of the new cable is only equal in weight to 5 miles of D. 5, and that each cable-wagon would thus carry 8 instead of 5 miles of field cable. That is such an improvement that by the use of the new cable it will, I think, be possible to push forward the operations of telegraph work still further than has been done at present. But there is one principal thing which must not be forgotten in considering questions relating to strategical and tactical telegraphy, that is, whether we are dealing with advancing warfare, or with warfare in position. Now with regard to warfare in position, every telegraph Officer agrees to-day that telegraphic communication must be extended beyond the headquarters of army corps, divisions, and brigades, to the very outposts and advanced detachments of observation. There no longer exists, therefore, any difference of opinion as to the use of the telegraph, electrical as well as visual, in warfare of position, but it becomes quite another consideration with a rapidly advancing army, that is, when we treat the case of "advancing warfare." The vast difference of opinion to which I have alluded refers principally to this latter form of warfare; hence the discussion of a paper on "The Use of the Field Telegraph in War" must necessarily direct itself to the question, how far telegraphic communication during the operations of advancing warfare can advantageously be carried out, and, therefore, ought to be adopted? In my opinion a well-planned field telegraph organization ought to provide all the elements, "personnel and matériel," to maintain not only daily uninterrupted communication between the base of operations and the advancing headquarters of the armies and army corps, but also in special cases of necessity and on favourable occasions, to extend their communications towards important points near or at the front, especially at those moments when decisive battles are expected. But a well-planned field telegraph must also possess all the necessary elements to enable it to be changed at once from its strategical work, consisting in the connection of headquarters of an advancing army, to its tactical work, spreading out the telegraphic communications to the smaller bodies of the army, and even to the outposts and battle-fields, should the form of warfare suddenly change from that of advancing into that of position. That the field telegraph can be brought to the front and be used there with advantage during the outset, was proved over again in 1882, by the splendid action of Sir Arthur Mackworth before, during, and after the battle of Tel-el-Kebir, and I regret, with Major Beresford, that during the Nile expedition of 1884-85, when the decisive battles were fought north of Khartoum, the most advanced field telegraphic station at Hamdab was over a couple of hundred miles at the rear of General Sir Herbert Stewart's column advancing on Metammeh. In spite of this unfavourable fact, which tends somewhat against the doctrines of advancing telegraphic communication, and participating in tactical operations, I nevertheless maintain the opinion, also favoured by such experienced telegraph Officers as Colonels Hamilton, Armstrong, Jelf, and others, who in this very hall, on the 15th of February, 1884, opined that "the telegraph should be able to follow advancing columns and keep uninterrupted communication with them." Such achievements will be greatly assisted by the method of paying out bare wire, to be supported later on by field posts, and using Captain Cardew's vibrating sounder, or by adopting any such field cable as I have the pleasure to lay before you, by which not only the strength of the line is doubled, but the proportion of cable carried by each wagon is increased from 5 to 8 miles. The adoption of such technical improvements is required in order to extend the sphere of action of the field telegraph during "advancing warfare."

Lieutenant-Colonel JELF, R.E.: As there seems to be a disinclination on the part of people who have more right to speak than myself to give their views, I may perhaps be allowed to justify the old adage "that fools rush in where angels fear to tread." In doing so it may perhaps be found of interest if I give some little account of the line that we laid, in connection with Sir Charles Warren's late expedition, from Barkly up to Mafeking and as far as Molopolole, in South Africa. This telegraph was laid in a country which absolutely had no telegraphs at all; we found a perfectly clear space before us, but we had to take every single article of equipment from England, 7,000 miles by sea, and another 1,000 miles by land, before we arrived at our point of departure. Sir Charles Warren's great idea was to have the

telegraph with him, at all events as soon as he moved, and if possible (in places where it was safe, and as long as it was safe) actually in advance of him, that is to say, with the most advanced party, a sphere of operation which I think has been mentioned to-day as one of the possible rôles of the telegraph in future. One of the great difficulties that we had to contend with, looking at the magnitude of our plant, was the very small number of men we had to deal with it. We only had one Officer and forty-five men of the Royal Engineers for the purpose of constructing and working this telegraph, a distance of 220 miles from Barkly to Mafeking, the latter being the point to which Sir Charles Warren was bound to penetrate with all possible despatch. We were met at once by difficulties, political as well as strategical. We knew that very many people in Griqualand West (which properly speaking is part of the Cape Colony) were as disaffected as those in any portion of the South African Republic, though it was generally supposed that the South African Republic was to be the enemy that we were to meet. It therefore became necessary at the very earliest start from Barkly to treat the expedition as being in an enemy's country. The earlier part of our marches were all carried on under the escort of cavalry, or mounted infantry, and the telegraph was laid and protected in exactly the same way as if expecting an attack at any moment. We always lingered at night, and proceeded with these precautions as far as Taungs. The distance covered each day by the advance was about 6 miles—6 miles a working day—and that was the rate of progress we carried on throughout the whole 350 miles of wire that were constructed. No doubt the number of miles a day that can be done in telegraph construction depends absolutely upon the number of men. We had not sufficient men to find more than two wagon detachments a-day, and frequently could only find one detachment. If we had had more men we should of course have done more, and on occasions we actually did as many as 9 and 10 or 11 miles, but that was on special occasions when it was of importance to complete a section of the line. Looked at strategically, the line selected strikes one as being somewhat hazardous; that is to say, it is carried on the whole distance within from 5 to 30 miles of the borders of the very people who were supposed to be our enemies. Of course that was entirely beyond the control of the telegraph staff; we merely had to do what Sir Charles Warren required for his own march. As far as Mafeking the telegraph was, as I have said, constructed at the rate of 6 miles a working day, for that distance of 220 miles. The distance from Mafeking up to Molopolole made the total length of the wire 350 miles, but that addition was merely made subsequently for the purpose of the occupation. That also carried on at the same pace, though without the same precautions that were taken at those earlier portions of the proceedings when we did not know how far we were likely to be opposed, or how far we were to be let go without attack. Our main difficulty was to get sufficient matériel. The whole of it as I have said had to come from England. When we first went out we only had 100 miles, of which only 20 miles was actually with us, but the remaining 80 miles reached us before we got to Griqualand West, and, therefore, in time for us to use for our first distance. In the whole of South Africa, to show how very dependent we were on what we got from England, we had the greatest difficulty in scraping together 30 miles of wire, and it took several weeks to get this. It must be remembered that we had to drop at every one of the eleven stations at least one clerk and one lineman. That being so, you will readily see that we were exceedingly pinched for men, but there is no doubt that the men we had got had derived great advantage from the fact that they had been practised together in peacetime. There is no doubt that certain campaigns out that we had had in the summer, by which we had been enabled to teach the men exactly what would have to be done on active service and in open country, helped greatly towards the rapid execution of the line that we laid. The strict discipline of peacetime also prepared the men for the positions of great responsibility and independence which must necessarily fall to the lot of clerks and linemen on active service. Small parties had to be left along the long line of communications with all sorts of temptations in the shape of stores, public-houses, &c., in their way, affording them every inducement to go wrong, but I am happy to say that I was particularly complimented by Sir Charles Warren upon the extraordinarily good behaviour of the men. That being the case, I am glad to make public recognition of it, and of the way in which they did justice,

when they came actually to be tried, to the pains which had been taken with their discipline in peace-time. Of the Bechuanaland Expedition there is nothing more particularly to be said, except that the line not only worked very well during the expedition, but I am happy to say that the 220 miles to Mafeking is working as well at the present time as when it was erected fourteen months ago. Now turning for one moment to the general question of the training of the men, and the suggestions that are being made with reference to improving our organizations for the future, the thing that mostly strikes me, as being rather an old hand at telegraph work (for I was with the troop when it was raised fifteen years ago), is the fact that notwithstanding the great advantage of pay and position that are offered in the Engineer service, it is with the very greatest difficulty in the world that we can get sufficient men to fill the ranks. Both at Aldershot, in London, and at Chatham we find the greatest difficulty in the world in getting men to enter, even with the attractions of good pay and allowances, so as to fill our ranks with the proper class of men. I cannot myself see how we are likely to improve that by going out into the highways and byeways. It seems to me that our great object should be either by some new system of enlistment and training, or by encouraging the enlistment of boys, and teaching them as boys, to try and get the very best men possible for the organization *as it exists*, getting them taught to be good telegraphists when young, and then gradually passing them into the reserve. What happens now is that almost as soon as we have trained a man we pass him to the reserve (and the very best thing too, because when we come to a large campaign we shall want such men badly enough). Still we must have something to carry on with, and certainly as far as my experience goes, whether we try army men or civilians, it is with the very greatest difficulty that we can get men suitable to fill these posts. No doubt so far as it went, the experiment of enlisting Post Office Volunteers into the ranks, and passing them into the reserve, has succeeded admirably. I know that as clerks they served us remarkably well, though I fancy that in the matter of discipline and soldierly qualities perhaps they had not got all that might be expected from those who had had a longer training. But when we come to trying to get assistance from the line, my experience has been most unfortunate. Throughout the whole of the Bechuanaland campaign, with one cavalry and four infantry regiments in South Africa, notwithstanding all my efforts to get some assistance from them, we could only get two men. One had only been a soldier a very short time, but we were able to make him fairly useful. The other was sent for 1,400 miles from the Welsh Regiment in Natal, with great paraphernalia and flourish of trumpets, and sent to Barkly. We found him absolutely useless, and for the whole of the rest of the campaign that man had to act as cook to the detachment. The same sort of thing has met me at other places. At Aldershot, where you would think that if there were any men to be got, we certainly should be able to hear of them, I can only say that it is not possible to get men from the line to work even the camp offices. I had the same experience at Gibraltar, where a few line and artillery men were employed in the military telegraph offices, but I always found it the case that if one fell sick or committed himself recourse always had to be had to the Engineers. I therefore cannot think that there is very much recruiting ground for us in the line, particularly at the present time, when, in consequence of the number of things that have to be taught, it is almost impossible to get men for any purpose whatever. Directly a man is found to be a good telegraphist he is probably also a good clerk, and as such is absorbed in the orderly room, whence I defy anybody to fish him out. I wish to add on behalf of myself and my brother Officers (as I happen to be the senior Officer in the Telegraph Battalion at the present time) that we fully recognize the fact that we must not stand still, and that we are only too anxious to do our utmost to meet the requirements of the times. Still I hope and believe that we may point with a certain amount of satisfaction to the fact that with all our faults, we have been able to carry out in the last eighteen months on a peace establishment three simultaneous campaigns, I hope without discredit to ourselves and with a certain amount of satisfaction to those under whom we have had to serve.

Major-General WEBBER, C.B., R.E.: I think I may safely say that never before in this theatre has such an interesting account been given of telegraphs as that which we have heard from Major Beresford to-day. My experience is that when a lecturer

attempts to deliver an account of the history of telegraphs, he must necessarily leave out a great many instances and examples of very great interest, and perhaps it would be better on such occasions if he confined himself to referring to the other accounts which are on record in our proceedings. This has particularly impressed itself upon me because Major Beresford has apparently been unable to obtain—and I believe it is at present difficult—a good account of the extensive and most valuable telegraph operations of the Afghan War. If any Officer here to-day can tell us how well the telegraph and signalling were there combined in the same service, it would be a very valuable record in the debates of this Institution. There is no good account of it, I believe, unless it be in the records of the Government of India, and it is certainly a great loss to the history of military telegraphs. As regards the subject of the uses of telegraphs in time of war, there is one which, I think, our present Chairman will testify to as being most valuable to the commander of an army, and that is the power of holding conversation. No one who has ever carried on a conversation, or who has been in the habit of doing so from time to time by means of a telegraph, can forget how he realizes being brought face to face with either his superior or his junior Officer at a distance of many hundred miles. All he has to do is to sit down beside the instrument, which the telegraph clerk manipulates, and with a piece of paper by his side and a pencil in his hand, record the questions and answers as they follow one another. His correspondent at the other end is doing the same, and it may be safely said that the speed of that conversation is very little less than half that of a conversation in which actual conversation was being carried on. The power of asking questions and of rejoinder, the power of obtaining alternative information, and so forth, is so great, that those who have used its aid must feel that large operations, where great distances intervene, could not be carried on without such means quite independent of the ordinary service of the telegraph, which, I may say, in such operations as the Nile Expedition, comprises the whole correspondence of the army. With regard to outpost telegraphs, which Major Beresford strongly advocates, I am rather sceptical. Years ago I had the opportunity, knowing the Director-General of Telegraphs of the German Army, of discussing this subject with him—and I must say I could not help agreeing with him in every word—he then said that the attempt to use the telegraph under the ordinary conditions of outpost duty was really out of the question. In this theatre myself, I have more than once said that a telegraph which is not served and maintained in the most perfect way is worse than no telegraph at all. Within the distance of outposts from the headquarters of an army corps or a Division, I believe that all who have ever been in command or have read an account of what precedes actions, either in the night or in the day, must know that there are indications in the air, that there is the sound of outpost firing, the sound of artillery, which tells every General and Officer in the Army almost instinctively what is going on; and I have very little faith in that sort of security which rests or depends on a telegraph instrument and on a wire lying on the ground, as a means of giving information to the Generals or Staff Officers, or telling them what the movements of the enemy are. In the American War, the orders to and the instinct of every General and Staff Officer were to move to where they heard the nearest firing, and I do think that that instinct which teaches us what to do, more or less may be lessened in its keenness if telegraph wires are known to be lying about between the headquarters and the outpost—a feeling which would only be lessened by the perfect knowledge and consciousness of the General as to how unreliable they are. Under this head I do not think that Major Beresford's scheme of regimental telegraphs is a very workable one; I do not say this from any feeling that such an organization, and such a unit in the economy of a regiment, might not be very useful to the men and very instructive to the Officers; but I think I know as much in the past, as Major Jelf has told you, of the difficulty of obtaining men to do this work from the infantry or the cavalry. I remember the day when the first Officers and men were placed under me in the 1872 manoeuvres, who were thought to be trained signallers, and I know how little they were able to do. We all know the high state of efficiency to which that body has attained, and I believe if there is to be any means of communication of a telegraphic nature in the regiment, it is better that they should confine their duties to that which they have proved themselves well able to perform. We, as I said before, do not know so much

as we ought to do of what was done in the Afghan Expedition by regimental Officers and men in signalling. If signalling is to be confined to the regimental unit where it can be well taught, I would do everything I could to improve that knowledge, to encourage it even more than it is now encouraged, and from time to time to bring large bodies of signallers together. This has been attempted in some cases very successfully, but I do think it might go very much further, and that long lines of signalling, which is really one of the most difficult things to establish and work out, should be a part of the summer manœuvres of our Army every year, both at home and abroad. Unfortunately there is one thing which, I think, has been a mistake in our signalling system. About ten years ago a revised edition of the signalling book was brought out with a most extraordinary result; it appeared that whoever made the revision desired that signalling and telegraphy should have an insuperable gulf established between them. The very alphabet and syntax of telegraphy was varied in signalling. With the view to approximate the systems, Colonel Malcolm, R.E., and I spent much time in revising the old edition. It went forward (as the term is), and we only heard from time to time rumours of what was being done. A few months after the new edition came out, diverging more than before. The only thing untouched was the preface which I had written myself. The evil consequences have been many. If the author's shade wanders here below, he may like to know how the evil of his deeds has lived after him. I think on every occasion on which I have seen signalling and telegraphy used in the field, there has been the most unhappy want of union and the most miserable absence of power to work together. Considering that they are both means to the same end, there can be no doubt that this proceeding is most irrational. The telegraphists and signallers of the Army only come together on occasions, and it is only common sense that on those occasions they ought to be able to work on the same system, and if there is any organization they ought to work under the same direction. I think that every signalling Officer who has had experience will cordially agree with me in this. I can't help endorsing every word that has been said on the subject of good training. We have been for sixteen years trying to organize a good telegraph service in this Army. It has grown up step by step; we may be very much to blame that we have not done it in less time, but I think now it has reached a point at which it may be said to be a good organization, which has stood the tests of late campaigns and has not been found wanting. I think those who have to do with these things will be best advised if they will allow the organization to go on on its present lines until it fails; then is the time to change and do away with it, or improve it in some other direction. There is a great craze for change with some people, and when there is a good thing they want to knock it over. Now our signalling is a very good thing, and our telegraphy is a very good thing; I should like to see them both go on on their present lines, only let them have the same language, the same alphabet, the same procedure, and when they take the field let them work cordially together to the same end.

The CHAIRMAN: I am sorry that I am obliged to go away, but before I do so I should like to add my mite to the discussion on this most important and really vast subject. There have been two or three things said that I may, perhaps, throw out a hint about. I have myself no knowledge of telegraphy, but I have had a good deal of experience of army telegraphy, and of the way the Officers and men of our Telegraph Battalion do their work in the field; and I am quite sure it is impossible for anybody who has not seen the men at work under the very difficult circumstances of field service really properly to appreciate the admirable manner in which that work is done. On two occasions I have had the general supervision of work that extended over a great extent of country, and was carried on entirely by telegraph, and on both occasions, the length of each being nearly a year, I never had one single complaint, and I hardly knew of any slip, however slight, on the part of any Officer or non-commissioned officer or man employed on telegraph duties. They were placed, most of them, in most uncomfortable positions, in tents, in stables or houses, with no proper accommodation; the work was incessant day and night, and the way in which it was performed was excellent beyond words. I should not be doing common justice if I did not say so. Something has been said against telegraphers from the line; that is my own branch of the Service, and I must to a certain extent defend it. Colonel Jelf was rather hard on the line

telegrapher. We do not, in England, attempt to teach soldiers of the line anything to do with telegraphs, but I believe a considerable use is made of them in India, and on every occasion on which I have been employed abroad with any regiments brought from India, there has always been a certain number larger than would have been expected of good telegraphers. I think Colonel Webber will bear me out in saying that in the Nile Expedition the telegraphic work in the advanced post was carried out in the early part of the campaign by privates of the Berkshire Regiment; and in 1881, in the Transvaal, a considerable accession of strength to the telegraph section out there was obtained by employing men of the 92nd and 60th, and the other two regiments that were brought on from India for the purposes of the then campaign. I think if we were to train in England a certain number of linesmen we should find they would give as good results as those linesmen do in India. Major Beresford mentioned in his lecture the fact that a bare wire was, during the little expedition, laid along the ground for use as a telegraph wire. It was, no doubt, his modesty which prevented him from adding what I believe is the case, that the buzzer that was used with that wire is due entirely to the invention of an Officer of the Royal Engineers, or at any rate that its present improved state is due to the invention of an Officer of Engineers—I would suggest for consideration by those skilled in the matter whether we have sufficiently tried the telephone in war. I cannot help thinking that in the case of the very conversations that Colonel Webber alluded to the telephone would be more useful than a telegraph instrument. When a senior Officer is holding a conversation with a junior Officer, the junior Officer, even if he wants to ask a question in the middle of a sentence, does not like to stop the operator and ask, but he could do that with the telephone. It occurred to me once, in the course of a conversation with a senior Officer lasting nearly an hour, that the clerk taking down one word wrong threw out the whole sense of my instructions. I should have asked the question at the time and stopped him because I thought it was wrong, but I did not like to stop the long instructions I was receiving. I asked, afterwards, but my question was not understood, and consequently I misunderstood the instructions. Another point for consideration is that mentioned by Herr von Treuenfeld: "Cannot we decrease the weight of our insulated wire, and have we yet obtained the lightest and best insulated wire we can get?" I do not know enough of that question to go into detail, but it appears to me that the greater the length of insulated wire we can carry with our field telegraph the better it will be for us.

The Chair was then taken by Sir J. STOKES.

Major E. J. BROWELL, R.A.: Major Beresford, in his very interesting lecture, has alluded more than once to the signallers at Suakin. As I had charge of the signalling arrangements in the last campaign there, I should like to make a few remarks on the subject. He stated that when the telegraph was broken down the signallers took up the running, but that although they rendered valuable assistance they did not adequately fill the gap. Of course they did not, and I maintain that no signallers in the world could do so. Of course a telegrapher can send his messages very much quicker than a signaller; he sits in his tent with his instrument by his side, and does his work in comparative quiet and repose. The signaller on the other hand, is perhaps on the top of a rickety crow's nest, and by the very nature of his instrument exposed to the sun and the dust all day long. Of course there is no doubt in the world that the signallers are not as efficient as telegraphers. Major Beresford has said that the operators he had with him were some of the best the Post Office can produce, so that in any case I maintain that if there was a pressure on the telegraph, and its work was transferred to signallers, there would naturally be a block. Colonel Webber said the language of signalling was different to that of telegraphy. It was certainly the case some time ago, but I know the idea now is to assimilate it absolutely to the telegraph, and I believe it is exactly the same. Major Beresford mentions with regard to Sir John McNeill's zarefa, that "at 7 P.M., the line was cut, and signallers took up the running with camps to the Right Water Fort." It may be interesting to the meeting to know what the signallers did that day. They went out completely equipped, with Sir John McNeill's force. On arrival they communicated with the Right Water Fort, and maintained communication more or less all day, but of course the General

Officer commanding used the surer and quicker medium of the telegraph wire for his official messages. The fact that when the line broke the signallers took up the running is, I hope, to be considered satisfactory to the signallers generally, especially as very hard work was got through, comprising messages containing the regimental numbers and names of the killed, wounded, and missing, the work extending far into the night. The wire was certainly mended the next day. The day following it again broke, and the General gave orders that the wire need not be repaired any more as the heliograph was working so well. A few days afterwards, during the advance on Tamai, the signallers had a great press of messages to work through. One press message came in 205 words, and so on. From the extreme point reached, messages were written by Sir Gerald Graham right away to the Queen and Lord Wolseley, and heliographed as far as the Right Water Fort, where the field telegraph had an instrument.

Captain CARDEW, R.E. : I have here an instrument, a portable telephone box with vibrating call, which I should like to exhibit, though as it only came up this afternoon, I have not had the opportunity of trying it. Major Beresford, in his paper, alluded to these vibrators (Transmitter, Vibrating, Mark II), and I think, on one occasion, he called them Theiler's sounders, and, on another, vibrating sounders. This instrument is not used by us as a sounder at present. It might be described as a vibrating sounder by itself, and was originally deduced from the instrument known as the vibrating sounder. We use it as a transmitter, that is to say, as a means of converting an ordinary battery current into a vibrating current, which has more effect on the receiving instrument, viz., the telephone, and thus more efficiently utilizing the telephone as a receiving instrument for telegraphic signals. The battery current is converted into a vibrating current of a certain period, which is far more audible in a telephone than the mere make-and-break signals such as the signals in the ordinary Morse key. The chief advantage of the telephone as a receiving instrument is that it never requires any adjustment. Any of the ordinary Morse instruments require delicate adjustments, and if the current strength alters from time to time, as is often the case on field service, and the instrument requires readjustment, it sometimes leads to considerable delay, particularly when communication is wanted to be established after an interval of rest. If the receiver does not get his call signal owing to want of adjustment in his instrument, there is very often considerable delay. The telephone always responds to the call however it is varied. That is the principle of this system. I need not go into the details of the connections, except to say that the vibrator is put across the battery so that the current to it is always the same, and is independent of the condition of the line. It should not, therefore, often require readjustment, and even should this be necessary, it does not entail serious delay, as the instrument is at the sending end of the line. I have here another instrument, a portable telephone box, which is intended for a purpose which should be kept distinct, that is, for telephoning as distinguished from telegraphing. Unfortunately, in order to make the telephone sufficiently audible at any rate to inexperienced ears, it is necessary to use a microphonic transmitter, that is to say, to make use of a battery current modified by the action of speed, and not merely to speak into the telephone itself. Of course everybody knows you can use the telephone to speak into; it is both transmitter and receiver; but it wants a good deal of practice to hear with this arrangement, whereas the use of a microphone gives you a louder result. Colonel Jelf asked whether we could get men at Chatham. I may draw attention to the fact that we do not profess to retain telegraphers there, in fact whenever I get a good telegrapher he burns in my hands till I get rid of him. I regard him as quite wasted at Chatham, and he should be doing service in the Telegraph Battalion. As regards the training of men, I do not think it is feasible. I have a good deal of experience in instructing men in telegraphy, and I do not think it would be feasible to take the ordinary Tommy Atkins, as he enlists, and with his present short service make him an efficient telegrapher before we have done with him, but I do think a great deal can be done by taking boys. The proper way to train telegraphers is to take boys as young as you can, as is done in the Post Office. If you take boys who have had a good schooling, you will train them in about one quarter the time that it takes to train a man, and they become very much more efficient.

Lieutenant-Colonel HAMILTON, R.E.: I only want to say two words in confirmation of what fell from Major Browell, that the system of telegraphy and of signalling are now as nearly identical as possible consistently with the different instruments that are used. I say this because about two years ago I was on a Committee in conjunction with the Inspector of Army Signalling in revising the "Manual of Army Signalling," which was then brought into exact harmony with the telegraphic system.

Major BERESFORD: I am very sorry that time did not allow us to hear Herr von Treuenfeld to the end, and I only hope he will give us the remainder in writing, because I have no doubt everything he gives us on the subject of telegraphy is most valuable. He spoke of insulated wire; I have here a new pattern of insulated wire, sent in by Messrs. Siemens Brothers, which Herr von Treuenfeld expects will cut out everything else, including D. 5. Its core is a combination of steel and copper, and it is said to be not only very much lighter, but very much stronger than our D. 5. There is also a pole exhibited which Messrs. Siemens have sent in as an example of how light an iron telegraph pole can be made. I have also here an insulator, proposed by Herr von Treuenfeld as a field insulator. I cannot agree with Colonel Jelf's remarks about men from the line. There are many men, capable of being trained as telegraphists, to be had from the line regiments—there is not the smallest doubt about it—if you can get hold of them from the commanding Officers. I do not say the very best man, but one of the very best men of my section at Suakin, was a 92nd Highlander from the Reserve. At the present moment he is employed by the General Post Office as a civilian, and has been promoted, or is about to be promoted, in that department. When we left Suakin, the telegraphs were taken over by the Shropshire Regiment, and they have been working them up to the present time. They may not be able to do the work as well as Telegraph Battalion men, but they can perform good service, and with further training they would become more and more efficient. In India, men from all regiments are employed. I had a conversation yesterday with Mr. Reynolds of the Indian Telegraph Department, and he gave me a very interesting account of how the telegraphs are worked in India. He had the preparing of all the material for the Afghan War, though he was not himself present at the field operations. There was a very good piece of telegraph work done in India some years ago in connection with the famine—that telegraph was carried on under the superintendence of an artillery Officer, Major Mallock, who, I think, is now at the top of the tree in the Telegraph Department. General Webber said there was no account of the telegraph operations in Afghanistan. Mr. Reynolds told me that there were two accounts to be found in the "Proceedings of the Society of Telegraph Engineers." I have not, as yet, seen them myself, but General Webber may know of them—one is written by a gentleman of the Indian Telegraph Department who was present himself during the operations. General Webber said he had very little faith in outpost telegraphy, and that it has not been tried. Well, all I can say is you do not know what you can do till you try. Twelve years ago at Aldershot there was very little faith in the Telegraph Troop itself. I remember on one occasion at that particular time when we were supplied with an exceedingly faulty cable and worthless instruments; there was a battle out on the hills to the south of Aldershot. One division of the defending army was on the Hog's Back, and the other on Hungry Hill and at Cæsar's Camp. Captain Macgregor, afterwards killed in the Transvaal, and I were working the telegraph; he was on the Hog's Back, and I was on the other flank; the line was working perfectly for a wonder, and early in the day he telegraphed to me as follows: "The enemy are leaving our front, and moving towards your flank, so look out." I brought this telegram to the General, and he laughed at me. He hinted the telegram was a creation of fancy, and he did not believe in the information for a moment. Half an hour after that, the enemy were across our right flank, and rolled us up into Aldershot; such a defeat was never suffered in peace manoeuvres before or since. Sir Redvers Buller mentioned the telephone. I think the telephone in some cases would be most useful, but I do not think when any active operations are going on that it would be reliable. The telephone is not such an accurate instrument as one may think—the words are very likely to be misunderstood—I prefer the sounder as being far more reliable.

Certainly the telephone saves clerks, for it is not necessary that a telegraph clerk should be present to work a telephone. Major Browell spoke on behalf of the signallers. In my remarks about them, I did not mean to say all that could have been done with the existing means was not done; I know it was carried through with credit by the Officers in charge; but what I assert is, that the men that were given were not educated enough for the work in connection with the telegraphs, and that if Major Browell had had telegraphers under him who were signallers also he would have done a great deal more. At McNeill's zarefa, the signallers did their work excellently, but that was not on the main line of army communication—not where the press of traffic was going on. I do not think I have any other observations to make except to thank the gentlemen who have been present at this lecture.

Sir J. STOKES: Gentlemen, you will not expect many observations from me as I have taken the Chair at very short notice. I should like, however, to make one or two remarks on what has passed. And first I must say it is extremely gratifying to me as an engineer Officer to have heard Sir Redvers Buller's high encomiums on the work done by the Telegraph Battalion of Engineers in the field on all occasions which had come under his notice, and I am sure it must have been highly gratifying to the Officers of that battalion present to have heard those encomiums. As regards the observations made on the probability of using the men of the line and cavalry with the engineers, I am certain that in individual instances there may be very excellent telegraphers found in those branches of the Service; but it seems that on some occasions when they have been most wanted there have been great difficulties in getting hold of them. I am equally certain that whenever they are found they will always be welcomed and gladly attached to the Telegraph Battalion of the Royal Engineers as most valuable auxiliaries in the work they have to do. I cannot help thinking that those who wish to establish a different order of things to that which now exists do not fully realize the extreme difficulty of finding proper material in men and training them, and getting the boys and training them for the work they have to do; but, as I said before, we shall always be glad to receive assistance from the other branches of the Service if we can get it. As regards the proposition of telephoning, I think Sir Redvers Buller lost sight of one very important difference between sending telegrams and speaking by telephone; there may be an occasional mistake in the telegram, but at all events it is recorded, and whatever is sent stands and remains on paper and can be referred to hereafter as a proof of the wrong order having been given; but in the telephone the order is heard, forgotten, and passes away, and there is nothing to prove what the order has been. I think that would be a very great difficulty in sending military orders by telephone. I cannot sit down without asking you to record a vote of thanks to Major Beresford for the admirable paper he has read to us. And I think we owe very much to the gentlemen who have taken part in the discussion, for they have thrown a great deal of light upon the question, and in saying this I must especially mention the remarks made by Herr von Treuenfeld.

Friday, May 7, 1886.

MAJOR-GENERAL SIR ANDREW CLARKE, G.C.M.G., C.B., R.E.,
Inspector-General of Fortifications, in the Chair.

THE DEFENCE OF LONDON AND OF ENGLAND.

By Major H. ELSDALE, R.E.

PART I.—*The Security of London against a Coup de main.*

THE apparent indifference of the British public to the most important and vital questions connected with the defence of the Empire, and the languid and fitful interest in them displayed by the Government, are most distressing to every well-informed member of this Institution.

Professional papers and discussions within these walls exert, it is to be feared, but little direct influence towards the enlightenment of the people generally. But indirectly they have their value. They clear the air and tend to the formation of an enlightened and matured body of professional opinion on important questions connected with our defences and the maintenance of our Imperial position. This reacts in its turn through innumerable channels upon the country generally.

But whether this be so or no it is our duty to deliver our testimony. It is our duty, as it seems to me, to have a well-considered opinion upon these important questions, and to be always ready to support and maintain it. And in order that such opinions may be sound and defensible it is most desirable that individuals among us should here submit any views or ideas which they may have been enabled to form on any of these great questions connected with our defences to the judgment of their brother Officers in both Services. The subject will then be well ventilated, and individual opinions corrected and enlightened. It is in such a spirit that I would now venture to invite your consideration of the important question of the defence of London.

There is no need to go into elaborate statistics to show the huge population, the vast exports and imports, the immense mass of shipping, the altogether enormous amount of property involved, and the magnitude of the interests at stake in the security of the metropolis itself. This, however important, is but a small part of the general question, only the outer fringe of it. For let us consider for a moment what the loss of London really means. The capture of London by an enemy means that that enemy has grasped England firmly by the throat. He can force his own terms upon her wherever British interests are at stake all over the world. It means the loss of our

Mediterranean fortresses, which are an object of supreme desire to the Mediterranean Powers, Egypt and the Suez Canal in the hands of the French, Simon's Bay and Cape Town given over to an independent South African Republic or to a foreign Power, the total loss of our communication with India, and India itself gone from us. It means our empire of the sea destroyed, our enormous mercantile marine sailing under other flags, and the course of trade diverted into other channels never to return. It means an enormous war indemnity to be paid, a largely diminished revenue from which to pay it, and the country weighed down by a crushing load of taxation. It means a bankrupt exchequer, pauperism and crime rampant everywhere in our midst, and England hopelessly degraded to the rank of a third or fourth rate Power. I do not, of course, assert that all these consequences will necessarily and at once follow the capture of London. But who will be bold enough to deny that they are all potentially wrapped up in it, and that any or all of them may be looked for as a natural and direct consequence of it? Like Carthage of old we have built up a vast and highly artificial edifice, based not upon broad acres of fertile soil, but upon maritime superiority and commercial success. Its centre of gravity lies in London. When London falls will not the whole fabric be likely to go with it, like a child's palace of cards when the foundation story is upset? So Carthage fell and her wide dominions fell with her.

The defence of London is then of supreme importance to the whole British Empire. The French, whose interests in the safety of Paris are far less than ours in that of London, have first constructed a whole series of formidable works for its defence, and then finding by their war with Germany that these were insufficient have set themselves to remodel and improve those defences on the most elaborate scale, thus deliberately and after the most crucial experience recognizing the necessity for defending their capital. Is it possible that with such an example before us we yet do not think it worth while to spend a penny on the defence of London?

But, it is continually said, there is the Navy to defend us. No doubt there is, and a very evil case we should be in without it. But without pretending once more to discuss the thrice-discussed question of the strength of our Navy, and taking only the broadest and most general view, let us ask any well-informed naval Officer whether he thinks the Navy has ever been in this generation, or is likely to be in the immediate future, strong enough to protect our vast commerce all over the world, to ensure the safety of our food supply, to meet and beat any possible enemy's ships on the high seas, as well as to guard our shores from a landing and our unprotected commercial harbours from the enemy's cruisers, besides securing its own as yet unprotected coaling stations abroad. Is there a capable naval Officer to be found anywhere who in view of the unknown and dubious elements introduced into naval warfare by the competition between guns, armour, ram, and torpedoes, and the confessedly uncertain course of the next great naval struggle, will think it reasonable or justifiable to throw upon our Navy the tremendous responsibility of being the

only reliable barrier to the invasion of our shores and the loss of our capital? And is it not a matter of the simplest common sense that the way, and the only way, to set our Navy free for its most responsible and arduous duties on the high seas and all over the world is to protect all our great ports and harbours independently of it, and to arrange without it, to give a good account of any possible or probable enemy landed on our shores. When the strong man's house is strongly guarded at home he is in a position to put forth his strength wherever it may be required abroad. Otherwise all his efforts abroad will be perpetually hampered and paralyzed by the necessity of keeping an eye always fixed on his house at home lest the enemy should burn it down during his absence. These things are so simple and so undeniable that I should apologize for stating them once more were it not that so much error and confusion of thought seems to prevail popularly upon the subject that we cannot apparently repeat the facts of the case too often.

Another reason which has probably contributed largely to prevent the defence of London from being seriously considered, is the idea which prevails generally that nothing can be done, or nothing worth doing, in the way of such defence without going to a vast expense in a huge chain of forts or permanent works all round it. It would ill become Officers of a corps whose primary duty is fortification to disparage what may fairly be termed their own speciality. Nor am I for one moment prepared to contend that the construction of a suitable chain of powerful permanent works for the defence of London capable of resisting a regular siege is not an object in itself desirable, and one which a strong and patriotic Government might not most reasonably undertake, considering the vast interests at stake. Hereafter we will further consider this question. But for the moment let us lay aside all professional or other prejudice, and simply ask the question, Without going to the very large expense which such permanent fortification undoubtedly involves on the one hand, or leaving our capital in its present defenceless condition on the other, is there no middle course which at a very much less cost would go a very long way to render London practically secure, by making its capture a task of such magnitude, difficulty, and uncertainty as would, under all ordinary circumstances, and so far as we can reasonably foresee, be sufficient to prevent any possible enemy from attempting? Because the Government is not prepared at this moment to give us the 4,000,000*l.* or thereabouts required for fortifying London thoroughly and properly, are we therefore to sit down and fold our hands and do nothing, without asking for the much more moderate sum necessary for providing our field army with a strong reserve position to occupy or to fall back upon for the defence of our capital? Cannot such a strong defensive position be forthwith established at a very moderate cost, and afterwards strengthened and reinforced by permanent works to any required extent whenever the money may be forthcoming for the purpose? Most undoubtedly I think it can. I propose to devote this first paper to an examination of this question.

Let us first review briefly some of the leading and governing condi-

tions with which we have to deal, and then consider how best to meet them.

The first cardinal condition with which we have to reckon is, it seems to me, this: that the defence of London against a *coup de main* is a separate and very distinct question from that of permanently fortifying it in a regular way, and a matter in itself of far more urgency and importance. By a *coup de main* I mean a sudden invasion by such a number of troops as the enemy could reasonably be expected to ferry across the Channel at or about the same time. The exact number which could be so transported is a matter which is open to much argument. Following the authority of General Collinson, who has carefully considered the question, I shall here place it at a maximum of about 150,000 men. But without entering into any discussion of the exact figures, for which we have no space here, and taking the above number as a sufficient approximation for practical purposes, I hope it will be generally agreed that the moment we place it out of the power of the enemy to begin and terminate the invasion of England at a blow by a rapid march on London with such forces as he can bring on to the scene at once, whenever he can succeed in obtaining the temporary command of the Channel—that moment all the conditions of the case are radically altered. The problem of the successful invasion of England then assumes a very different and far more formidable complexion. For in order to maintain and supply the large force which will then be necessary for successful invasion, the enemy must first capture and establish himself securely in a more or less convenient and commodious harbour or port on the coast as a base of operations. He must undertake large and leisurely operations involving the command of the sea for a prolonged period that he may be able to bring up strong reinforcements and great trains of supplies with reasonable certainty. He must necessarily give an invaluable breathing time to the defence, and we shall be enabled on our side to concentrate to resist him the whole power of a highly organized country like England, rich in men, material, manufacturing appliances, railways, transport, telegraphic communication, and all the elements necessary for developing an enormous military and naval strength. The capture of London instead of a single operation will then become the goal and climax of a whole series of separate and more or less distinct operations, involving at each and every stage fresh chances for the defence and fresh possibilities of failure and ruin to the attack. These successive stages of the problem I propose to examine in more detail in another paper. Let it suffice now to submit to your judgment that the security of London against a *coup de main* or sudden attack by a moderate force is a matter of the most pressing national importance, which ought to be considered and dealt with separately from, though no doubt in connection with, the further question of fortifying it against a more formal and leisurely attack by much larger forces. This latter, though doubtless important, is by no means such a pressing and urgent matter. And many other conditions and collateral questions here come in and demand careful consideration before we can assign to this question of the permanent fortification of

London its due and proper place in any well-adjusted general programme of our national defences.

The next ruling condition with which we must reckon, and which if we are wise we shall fully recognize at the outset, is that we cannot rely upon our present standing Army or upon the Militia, including, of course, their reserves, for the defence of London. It is out of the question. I do not propose here to go at length into the figures which have been repeatedly brought forward in this Institution. But this cardinal truth, upon which all our arrangements should be based, can be sufficiently perhaps exhibited by this consideration, that if we imagine any, the most ordinary, combination of circumstances under which the question of the invasion of England would be likely to be seriously entertained by a foreign enemy, or coalition of enemies, we shall find that all our regular troops are likely to be urgently required elsewhere and cannot therefore be relied upon at the critical moment.

Any number of such combinations may be imagined, and probably the real one whenever England is invaded will differ widely from all of them. For in politics and war it is almost always the unforeseen which actually happens. But let us assume, as no improbable or extravagant assumption, that we have been obliged again to dispatch a strong force to India to quell an insurrection among the large armies which the protected States are allowed to maintain, or to ward off a threatened invasion from the side of Afghanistan set on foot by Russia. Or, which is not at all unlikely, let us have to meet both these contingencies simultaneously. Or, again, let us be obliged to send a strong force to Egypt to reinforce our present considerable detachment there. This may happen at any time. In either case a large slice of our available fighting force will be required. If now we make up our Mediterranean garrisons to the considerable war strength which in the event of a war with a first-class Power or Powers will be urgently required, and allow only the most moderate and reasonable war garrisons for the rest of our important fortresses, harbours and coaling depôts all over the world, including a proportion of trained troops for Portsmouth, Plymouth, Weymouth, Dover, Chatham, and the Thames Forts, the defence of which is clearly a necessity, as well as a moderate garrison for discontented and restless Ireland, and a nucleus of defence for our leading commercial harbours, we shall find that we have practically no men at all left to defend London in case of invasion.

I do not of course pretend that no regular troops would actually be available for such a purpose. Other necessary objects, such as the proper reinforcement of our foreign garrisons, or the defence of our home ports and harbours, would have to be sacrificed more or less for it. And I shall assume that a mixed force of about 60,000 men from our regular troops with the Militia, especially the latter, and their reserves, will actually be available. I assume this, because be the pressure elsewhere and demand for men what it may, no Government would dare probably to leave less than that number nominally available for the supreme object of the defence of London, though a

considerable proportion of this number are then likely to consist of more or less untrained recruits. But the truth is that our small Army, Reserves and all, is only just adequate, if it be adequate, to its normal existing responsibilities all over the world, and to provide men for our frequent little wars. In case of a serious or prolonged struggle anywhere its weakness must at once become apparent, quite apart from any question of the invasion of England.

Are we then going here to propose to double our standing Army, or to double or triple our Militia, and increase considerably its annual period of training, to admit of a proper course of annual musketry instruction in addition to a respectable amount of drill, and so to render it a more efficient and reliable force; or to introduce conscription? By no means. For whatever might be the advantage of any such measures in the abstract, they are outside the range of any practical discussion of the subject at this moment, and quite beyond the scope of this paper. My purpose here all through is to consider what means are practically possible and desirable as matters now stand, without any remodelling of our existing military system, or any considerable departure from present arrangements.

It comes to this, then, that whatever may be the number of our Regulars and Militia who may fortunately be in England, and available for its defence in case of invasion—which is a very uncertain matter depending upon a number of contingencies which we cannot now possibly foresee—their strength is certain to be altogether inadequate, and the brunt of the fighting must fall upon the Volunteers. It is to the Volunteers, therefore, and to their requirements, that we must mainly look for the defence of London. This means that all our arrangements should be adapted as much as possible to the genius and capacities of our Volunteers. These should be anchored down to the defence of a given commanding position for the main struggle, and exposed as little as possible to the necessity of manœuvring in the open against the much better trained and more handy and manageable troops of the Continental Powers. Any such fighting in the open as may be necessary should then be reserved for any available regular troops of the line, supplemented, if required, by the best trained and most efficient battalions of Militia and Volunteers. These should be brigaded together and kept well in hand for the purpose.

I allow at a rough estimate for a total of 250,000 men available for the defence, of whom about 60,000 above will consist of our Regulars and Militia, with their reserves, and the remainder, 190,000, of Volunteers. In allowing for this large number of Volunteers, representing the greater part of their efficient strength, which is 218,000 at present, I presume a very large increase to their number at such a crisis as is here in view. For if the judgment of Officers who are entitled to speak in their name is to be accepted, it is probable that 200,000 or 300,000 extra men who have already been through their ranks and received the usual training necessary for a certificate as "efficient" will then forthwith present themselves for re-enrolment, so that their numbers will be doubled or more than doubled.

Against this I make large deductions for men such as railway em-

ployés who cannot be spared from their work without disorganizing important and necessary industries, and for others employed in harbour and coast defence and in garrison duty. I therefore allow the above number of 190,000 men as available for meeting the enemy's main attack.

The question of time is of the greatest importance. Once let the enemy be established with a sufficiently strong force anywhere on the coast, and he will not lose an hour in marching on London. All his chances are bound up with pushing on. His well-trained troops are led by an experienced body of Officers to whom war has been a serious professional study. His object is to pit this compact and homogeneous mass, this scientific and well-adjusted machine, against our motley assemblage of troops in various stages of training and efficiency at the earliest possible moment. For he knows well that each day's delay represents a clear gain to the defence, and a harder task before him. If we can only gain time we can construct formidable works of defence, and can collect an enormous force to man them. For if the spirit of Englishmen be at all what it used to be, extra men will pour in by tens of thousands in such a crisis. We shall be likely to have more men than we can find arms for, or Officers and non-commissioned officers to instruct and lead, provided only we can gain time. It is clear, therefore, that it is our business to delay the enemy's march and yet avoid any serious action as long as possible. For a reverse to our forces at the outset would give the enemy a lead all through which we may never recover. It would encourage his troops by victory and depress ours by defeat, and go far to discount our chances in advance in the main struggle. An enemy's landing should of course be opposed by every means in our power, and when he has landed only a moderate number of troops every effort should be made to overpower and drive them into the sea before they can establish themselves firmly. But once let this have been done, and our proper course is while perpetually checking and delaying them at every step, to defer any serious fighting till we can fight at our own time and on prepared ground of our own choosing. The problem before us then is how to enable our composite force to fight at the greatest possible advantage in a very strong defensive position which the enemy can neither turn nor avoid. The defence must be capable of the easiest possible lateral movement to enable us to forestall any such flanking or turning movement on the part of the enemy, and make sure of being always beforehand with him.

The leading elements of our defence should also be simple, direct, and well understood, so as to admit of being taught to comparatively ill-trained men, and of being rehearsed by them on any favourable occasion in peace manœuvres. And our arrangements should be as mobile as possible to enable us to establish our line of defence at any threatened point and shift it as required to any other point at the shortest notice, or even to move it away from London and its defences altogether.

For here another very important and ruling consideration comes in, namely, this : that if we concentrate all our strength in any kind of

passive and immovable defences for our capital, the enemy will be pretty sure to refrain from attacking it altogether, and by suitable measures, as by harrying our country elsewhere, to force us to abandon our well-prepared defences and attack him in the open. And the more secure and strong we make the fixed defences of London, the more probability will there be of such a result.

To illustrate this point let us assume that by a sufficient expenditure we have fortified London so that its capture by such a reasonable number of troops as the enemy sees his way to bring over is a matter of great difficulty and uncertainty, if not altogether out of the question. What will he do? He will probably concentrate his forces by sea and land for the attack of, such a great seaport as Hull and the Humber, making very likely two or three false or threatened attacks elsewhere, that we may be kept in ignorance of his real intention up to the last moment. In the present condition of our defences he will probably take the Humber or any other of our great commercial harbours he may please to select without any very great difficulty. He will thus possess himself at the outset of one of the great seaports of the Empire, striking thereby a tremendous blow at our maritime and commercial prosperity. He will secure himself strongly in Hull, and take measures to enable him to maintain it both by land and sea as a temporary base of operations. He will then proceed at his leisure to march on Selby, Leeds, Bradford, Halifax, Dewsbury, Huddersfield, and all the large manufacturing towns in the district as far as Oldham and Manchester, and to possess himself of them one by one, if we do not oppose him. What are we to do? Can we afford to allow all the manufactures of this vast and most populous district to be ruined, hundreds of thousands of workmen to be thrown out of employment, and they and their families left to starve? I think we may most safely assume that no Government which might rule England at such a crisis could afford to do so. Such an overwhelming pressure would be brought to bear upon any such Government that they would be compelled to do one of two things—either to make peace with the enemy on his own terms, or to meet and oppose his further progress with the whole strength of England. This means that all the defensive works of London would have to be abandoned, and the contest fought out elsewhere.

Are we then hastily to assume that all such defensive works are necessarily vicious and a waste of public money? By no means; the argument only shows that such permanent defensive works, if any are to be constructed, must be considered and dealt with as part and parcel of a large and well-considered scheme for the defence of the British Isles generally, and not as an isolated object.

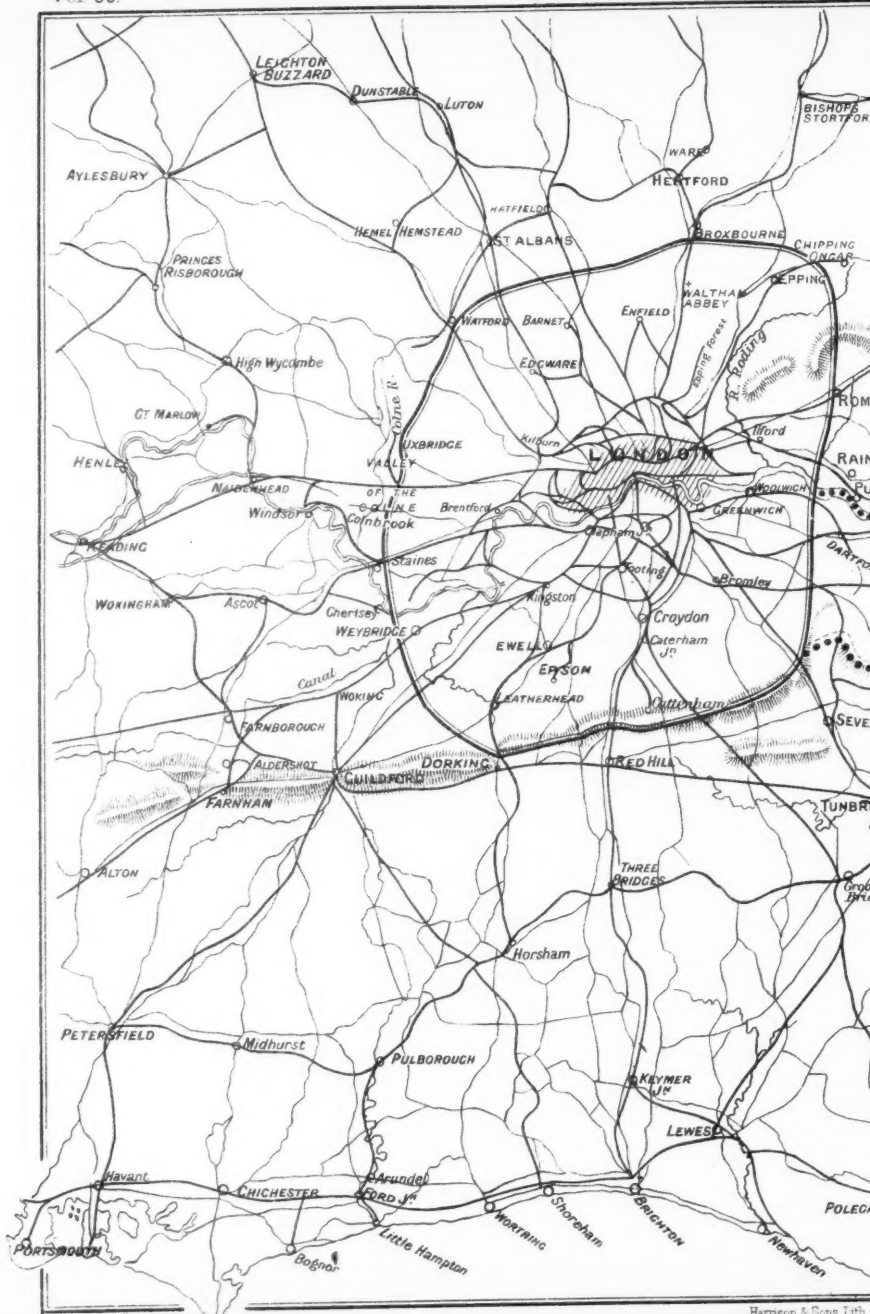
But the above argument does go to show, and I think to establish, that any defensive measures which we may decide upon as necessary for the defence of London should consist, as far as is reasonably possible, of movable elements, which in case of such action on the enemy's part as the above could be diverted from the more immediate object of the defence of London itself to assist in any operations which our troops may have to undertake elsewhere.

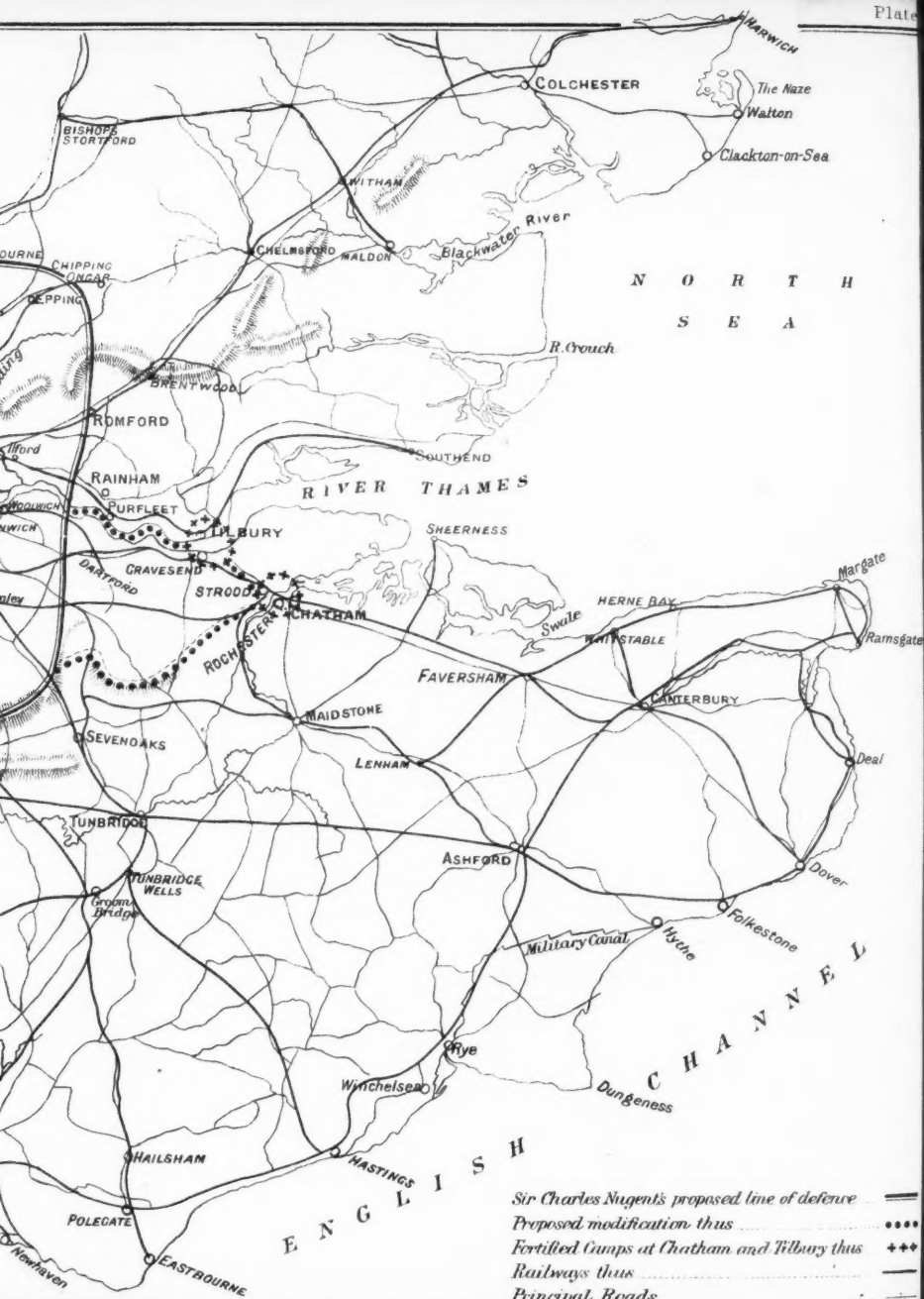
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There is another condition which I here propose to submit to and accept as an important and guiding principle in proposed arrangements. It is this: that whatever line of defence we may propose to take up for our field army, it should as far as possible be identical with the line of any proposed permanent works, or outer circle of permanent works, for the defence of the capital. These permanent works can then be added from time to time whenever the money for them is forthcoming, so that instead of constructing another and an interior line of permanent defensive works extra to an advanced fighting line, we should be merely supplementing and strengthening an existing line on one continuous and uniform plan. This arrangement seems to be required for the sake of economy of money, time, labour, and material, and in order that such funds as the Government may from time to time place at the disposal of the War Department may be utilized to the full by being spent on one uniform plan and as part and parcel of a single consistent design.

Lastly, for the sake of economy, we must apparently limit our proposed expenditure in peace as far as possible to those necessary elements which do not admit of being rapidly improvised in time of war. We should lay the necessary foundation in peace, that is which will enable us in time of war to organize a strong defence at very short notice.

I will now explain in detail the scheme of defence which seems to me best adapted to meet these conditions, and then make some further remarks upon it.

(1.) We must first fix upon our line of defence. This the Thames will naturally divide into a northern and a southern portion.

On the south side the features of the ground seem to me to mark out for us the best line to take up very clearly. The elevated ridge called the North Downs, ranging from Chatham on the east to Dorking and Guildford on the west, constitutes a strong natural line of defence, dominating as it does the whole country below for miles towards the south, and giving us almost everywhere commanding and excellent positions for artillery on and behind the brow of the ridge. The slopes in front towards the south are for the most part not too steep to admit of being swept by infantry fire, which is a great advantage. I am aware that other lines of defence nearer the capital have been advocated by high authority; but I feel sure that the more the question is studied and the ground gone over, the more will the advantages of this simple and bold natural line become apparent. At a suitable point on this ridge, at or near Dorking, our line will leave it and be thrown back to join the Thames near Weybridge.

On the north side of the Thames there is no such clearly marked out natural feature for occupation at a convenient distance from London, and in consequence there is much more room for difference of opinion. According to the point of view from which we may approach the subject, different plans involving a greater or less extension of the area of defence will find favour.

If we were to be guided strictly by a search for the most favour-

able ground and put up with grave inconveniences, such as an undue extension of the length of our line of defence, for the sake of it, we shall hardly, I think, stop anywhere short of the line of the Chiltern Hills on the north-west and north of London, and the sea or the coast features immediately commanding it on the east as far up as Maldon at the mouth of the Blackwater.

Although, however, I shall have very much in common with any Officer who will argue in favour of such a line as being our proper advanced line of defence for our field army, I do not here propose it for consideration. I greatly prefer to follow the high authority of Sir Charles Nugent, and to adopt in the main his line as shown on the large diagram. Leaving Weybridge this line passes along the Thames to Staines, and thence to Uxbridge along the valley of the Colne, which admits of being inundated to form a formidable obstacle against attack from the west. From Uxbridge it passes to the railway junction at Watford and thence in a north-easterly direction to the important railway junction at Broxbourne. From Broxbourne it bends in a south-easterly direction to cross the railway between Epping and Chipping-Ongar, and over the valley of the Roding southwards to the high ground on the south side near Havering and Romford; then down to the Thames near the mouth of the Ingreburn brook, adjoining the Rainham station of the railway to Purfleet and Tilbury. Hence Sir Charles Nugent's line would cross the Thames, and pass by Erith in a direction nearly due south to the North Downs range, while I should prefer to trend eastwards along the Thames to a fortified *tête-de-pont*, or circle of forts commanding the passage of the Thames from Tilbury to Gravesend, and thence to Chatham, which forms a fortified bulwark for the circle of defence at the eastern extremity. I prefer this latter course, because Chatham is thus included in the circle of defence; and the forts round Tilbury forming the northern side of the fortified crossing of the Thames will give us a most valuable entrenched camp to flank the north-western line of defence, and threaten the flank of any enemy advancing on London from the north-east coast. The length of this northern line from Staines on the Thames on the west to Rainham on the east is about 30 miles as the crow flies, and considerably more along the crest of the position; and the length of a military road, traced immediately in rear of the entire circle of defence, excluding that portion of it which passes along the Thames, would be about 100 miles, as nearly as possible.

We will now consider the nature of the special defences, whether active or passive, proposed for the occupation of this line, and then the important question of locomotion and transport for getting these into position at the right time.

(II.) A powerful artillery fire is the first requisite for the defence of any position. Forts may or may not be constructed according to circumstances, but the gun-power is essential. And if, as here, we are proposing to dispense in the main with forts, it becomes all the more necessary that we should secure a powerful fire of artillery. We shall entirely throw away the great advantage of our defensive

attitude in enabling us to put powerful guns into prepared positions if we do not take such decided measures in peace as will give us the necessary elements in war for establishing a decisive preponderance over the enemy's guns in the artillery duel at the commencement and all through the fight.

Viewing the urgent demand for our Royal Artillery in India and all over the world, a large proportion of them are certain to be absent. If at the time of invasion an expeditionary force should have left our shores, the number absent will be still larger, and at home a part will be urgently required for such important objects as the defence of Portsmouth, Plymouth, and Dover. Nevertheless, every man and every gun that can be brought together will doubtless be put into the field for the defence of London. But we should on no account stop there.

Not less than 180 powerful guns of position should be ready on the spot and manned by our Artillery Volunteers. No guns of obsolete or semi-obsolete patterns should be allotted to them. The existing 40-pr. Armstrong may have been a very good gun in its day, but it would be much better to assign it to the defence of our forts where there is ample scope for it. Our Artillery Officers in the gun factories at Woolwich are now, owing to recent improvements in guns and powder, in a most favourable position for constructing any required number of powerful guns of position likely to beat any existing guns in Europe of the same class, and far superior to the much lighter field-guns which an enemy would have to bring against them. The new 4-inch breech-loader, 22 cwt., would probably be an excellent gun for the purpose. These 180 guns would be put in aid of all the guns that our Royal Artillery can bring into the field, the number of which we cannot now precisely foresee or determine, as it will vary with the circumstances of the moment. The whole will, however, be likely to give us a decisive preponderance of gun-power. The advantage of this can hardly be over-estimated. The enemy will have the greatest difficulty in bringing his guns into action at all against the powerful shells which the heavier position guns will throw at ranges carefully measured and determined beforehand; and all through the fight our artillery preponderance will tell very heavily against him.

Only 3,000 out of the 38,000 Artillery Volunteers available will be required to man these guns; for this would give 16 non-commissioned officers and men per gun, which is ample. No expense need be incurred for horses in time of peace, or only occasionally for reviews and special training. The guns could be drawn by cart-horses whenever necessary.

The best course will be to give the whole of the guns over, under proper regulations of course, to the London Division of Artillery Volunteers. This is already 3,300 strong; and could then easily be increased, if desired, so as to leave a large margin for casualties and necessary deductions.

Doubtless the objection will be raised—"What, are you going to entrust the finest and most expensive guns of the latest improved

type to Volunteers?" The answer is one and the same all through to all such objections as this. Are we going to double our standing Army and our Militia, including the Royal Artillery? Probably it will be admitted that there is no chance of it at present. Then if so, if we must trust to our Volunteers, let us trust them. No position is more absurd and irrational for the Government and the country to take up than to say, "It is true that our Army is very weak, and that His Royal Highness the Field Marshal Commanding-in-Chief, who is by no means an alarmist, says distinctly that it is not strong enough for its work; but then we have nearly 220,000 efficient Volunteers to support it;" and to say at the same time to the Volunteers, "You are only an irregular force and we cannot trust you with improved modern weapons, though we do not mind letting you have a few second-rate arms of superseded patterns to burn a little powder and make a show with at an Easter Monday review." The real truth is, that there is nothing whatever in the service and management of guns of position, new or old, which our Volunteers are not perfectly capable of learning and of doing thoroughly well for every practical purpose. This they have shown several times already; in fact, whenever a chance has been given them. Let the Government, I would venture to say, trust the Volunteers and deal liberally with them. Let them say to them, "We will supply you with the finest guns that money can buy or science construct—the most powerful guns in Europe. You shall have them locked up in your own gunsheds under the charge of your own Adjutants and Drill Instructors, to drill with as often as you like. We will make special arrangements to enable your Officers and a reasonable proportion of the rank and file to go annually to Shoeburyness or Rye for practical instruction in gunnery with them; and we rely upon you for the defence of London." Who doubts that the Volunteers would respond to such treatment heartily and loyally? They would take the greatest possible pride and interest in these powerful weapons and make themselves thoroughly efficient with them. They would learn to throw up their own batteries for them and construct their own field magazines. Nor would they easily abandon their pets to the enemy. They would stick to them and fight them well, and be an invaluable force. But if any one thinks differently, we need not argue the question. It is sufficient to say as above, that the Volunteers must be so trusted and so employed unless we are prepared forthwith largely to increase our regular forces, or at all events our Royal Artillery.

Such a number as this of guns of position will require a large quantity of heavy ammunition, without which they would be useless. How are we to make sure of its being on the required spot at the right time, in view of the fact that the whole of these guns are to be moved as required to any point on the perimeter of this very wide circle of defence? We ought to construct good permanent magazines at intervals not exceeding 5 miles all round the position. There will then always be a magazine with ammunition within $2\frac{1}{2}$ miles at furthest of any point in our line. Considering that the length of front of the actual battle-field will probably be considerably more

than 5 miles, we shall then be certain to have at least one magazine within the portion of front embraced in the fight, and two more near to hand on the flanks as well. Thus all the resources of three large permanent magazines will be available without going more than a few miles to fetch them. The shells, which are the heaviest item, will be permanently stored there in peace. The cartridges can be added at short notice on the outbreak of a serious war. The question of locomotion and transport for moving this ammunition from one magazine to another, or to any required point of the position with the greatest facility, we will consider presently. These permanent magazines at 5-mile intervals will give a sufficient nucleus of magazine accommodation, and in addition any number of temporary field magazines will be constructed wherever required, when an invasion is imminent or in progress.

I would observe that the present paper, with the remarks above, was written in the autumn of 1884. For the reading of these papers has been delayed for eighteen months, owing to my absence on service in Bechuanaland and other causes. When addressing myself to this subject, therefore, I had not had the benefit of Sir Edward Hamley's most valuable and important article on "The Volunteers in Time of Need," which appeared considerably later in March, 1885. It is now most gratifying to me to find that the views above expressed received strong confirmation and support from General Hamley. I venture to quote a few words from his "Nineteenth Century" article to establish this, and strengthen my position by his great authority. He says: "It would be a most important step accomplished, to complete the step already in progress, of giving these guns (40-prs.) with their full equipment, as soon as possible, into the charge of the Artillery Volunteer Corps, who would use them in action, so that they might be thoroughly practised in the service of this kind of ordnance. Sheds should be built for the guns, stores for their equipment, and magazines for their ammunition, near the destined places of the batteries in the line of battle, which places they should be made to occupy on days of specially complete exercise."

I would also observe in connection with the above, that the views which I am here putting forward generally as to the necessity of a fuller and more complete recognition of the importance of the Volunteers—as constituting at present an integral and most essential part of the primary defences of the Empire against invasion—received strong support from Sir Edward Hamley's well-known article.

(III.) Such a substantial reinforcement of our existing strength in artillery as the above will enable us to await the enemy's distant attack with much confidence. But we shall grossly neglect the great advantage of our defensive position in a country possessing almost unlimited manufacturing resources in aid of scientific war if we do not also turn these to account in preparing a powerful reserved defence to meet the close infantry attack. By "reserved defence" is meant a defence which will remain more or less latent and unobserved by the enemy during the artillery duel and more distant fight, but which will come suddenly into energetic and unforeseen action with

decisive effect at that critical point in the struggle when the enemy's infantry is advancing in force at a close range to storm the position. Recent improvements in the construction of machine-guns give us exactly what we require. Let us place a force of not less than 300 of these in the hands of our Volunteers. The machine-guns should be of the most powerful and serviceable type procurable, whether the ten-barrelled Nordenfelt or the five-barrelled Gardner, or any other more approved pattern. The number of Volunteers required to man them will be 3,000 if we allow ten men per gun. The guns should be fitted with light bullet-proof steel shields, which should be painted brown to resemble the earth of the emplacements as closely as possible. A proportion of the batteries will fire towards the front, especially where required to sweep a special locality as a bridge or a road. In this case they will be masked as well as circumstances will allow and not brought into action at all to attract the enemy's notice until they can fire on this special line with the utmost effect. But for as large a proportion of these machine-guns as the ground and conditions of the case admit of, we should give up any direct fire altogether. They will be arranged to sweep the immediate front of the main position with a flanking fire. Accordingly they will be placed in positions where they will be screened from the view of an enemy in front and from his direct fire. They may be put behind a clump of trees or a group of farm buildings, or a projecting knoll or any other feature which will hide or shelter them. In addition, and especially where no natural cover is at hand, they will be protected from direct fire by being sunk at a low level under the lee of a thick bank of earth thrown up towards the front or on the side next the enemy.

A few of them may of course be disabled by the enemy's random shells before the time of their employment arrives, but it will be very few; for the enemy's artillery will be fully occupied in endeavouring to hold their own in an unequal struggle with our more powerful batteries. When at last the machine-guns open fire, their effect will be decisive. For the ten-barrelled Nordenfelt fires 1,000 rounds a minute, and if only one-third of these guns come well into play at the critical moment, at half speed they will be capable of sweeping the front of the position with 50,000 rounds a minute; that is, they will pour in an overwhelming stream of enfilade fire in aid of the direct fire of the rifles of the infantry. This sudden outbreak will be the first intimation the enemy will have of the existence of these batteries. And when he has discovered them, a considerable proportion of them will be so well protected by their retired positions and by the earthen traverses and steel shields that it will be extremely difficult, if not impossible, to silence them.

(IV.) The offensive elements of our special defensive arrangements come first, and are of much more importance than any measures for a passive defence. But having advocated a powerful reinforcement to our existing strength in the two most important departments of artillery fire against the distant and reserved machine-gun defence against the close attack, we can now afford to turn our attention to these more passive means of defence. Considerable quantities of gun-

cotton and dynamite may be stored in the permanent magazines on the outbreak of war with great advantage. These are invaluable for lightening labour and saving time in clearing the ground for fire or destroying roads, railways, or bridges. General Gordon has recently established conclusively the great value of automatic land torpedoes, and a large supply of them should be kept in the magazines.

Extra supplies of coarse powder and gun-cotton in combination with insulated wires and batteries would also be most useful for laying mines and fougasses at important points in front of the position over which the enemy must pass in force, or where he must place his artillery. There should be in the magazines a plentiful supply of picks and shovels for forming trenches and batteries, woodmen's tools for cutting timber and clearing, sand bags for loopholes and revetments, and iron wire for obstacles.

Our position, or the more purely defensive portions of it, to the exclusion of the offensive zone, will be greatly strengthened by the judicious employment of a large stock of the above materials and tools in the last forty-eight hours before the fight. The points where the brunt of the advancing enemy's attack must fall will then be known with approximate certainty.

(V.) We must now deal with the question of communications from point to point of our extended position. This is a matter of the most vital importance. Even if London were to be defended by a continuous circle of strong forts, a good military road for lateral communication all round the position would be very necessary. But when as here we have given up or deferred the forts as unattainable for the present, and propose simply to take a moderate proportion of the very large number of guns which they would require, and carry these about in the open in the shape of guns of position mounted on travelling carriages and machine-guns, the question of communications for enabling us to move these guns and their ammunition from point to point with the utmost possible ease, so as to anticipate a turning movement on the enemy's part, becomes a matter of supreme importance. In fact the whole of such a system of movable defence as is here advocated hinges upon two pivots—one the establishing the utmost freedom of communication and lateral movement on our own side, including of course the necessary facilities for the rapid transport of guns and ammunition—the other the hindering and obstructing all such movement on the part of the enemy to the utmost possible extent. We shall make sure of being always beforehand with him only by proper attention to these two contrasted and complementary issues. The latter point—the hindering the enemy's lateral or turning movements—we will consider later. Preparations for it can for the most part be left till the occasion arises. But the former question, the opening up of road and railway communication for ourselves, must be dealt with at leisure beforehand in peace. This will be one of the most expensive items in our whole scheme of defence. Whatever plan or system may be adopted London cannot be properly defended without such a provision, so that a large outlay for road-making is inevitable.

But, it may be said, are there not innumerable roads leading in all directions about England already? Undoubtedly there are a good many, but they are inadequate to the purpose here in question, viz., the enabling a General on the defensive to shift his position as rapidly as possible to his right or left, so as to anticipate the flank march of an enemy, and the providing him with good solid roadways whereby to get up his heavy guns rapidly into position in all weathers, and to keep them supplied with the large quantity of heavy ammunition which they will require. For it will frequently be found that there are no roads at all just where they are most necessary; and often the country is wooded and difficult in addition and urgently requires the opening up of wide communications. In view of the importance of the subject I should not quarrel with any Officer who would propose to do the work thoroughly well once for all, by opening up a good military road 100 feet wide all round the whole position. Any Staff Officer who has had experience of the movements of large bodies of troops along narrow roads will appreciate the enormous advantage and importance of such a wide road in rear of the line of defence. A whole Division of all arms could be marched along it without taking up a greater space than would be represented by the length of front which the troops would occupy when facing the enemy in a fair state of concentration. So the flank march of the army would involve no tailing off of long columns. Each Division could retire upon the road, march to a flank along it, and form up again facing the enemy in its new position without any delay, extension, or interference with the march of other Divisions. I do not, however, here propose such a formidable and sweeping measure as the construction of a new military road of this width. Nor do I consider its construction as essential. It will be far cheaper and probably sufficient for practical purposes if a much more moderate sum were to be devoted to improving, widening, and extending those existing roads which form the necessary communications along and in rear of the selected position, and to and from the magazines and nearest railway depôts. New roads would then only be formed here and there where most required. But it will be necessary to secure as far as possible solid well metalled roads along the rear of the position for the transport of the artillery with its ammunition and for stores of all kinds. Also solid metalled causeways or paths should be provided here and there to enable the guns to be got up steep or difficult ground leading up to the artillery positions. These causeways would save much labour and loss of time in getting the heavy guns of position up from the main roads in rear to the batteries, especially in bad weather and over soft and clayey soil. Also good communications are required with the magazines for enabling the heavy shells to be got up from them to the field magazines and batteries with certainty and dispatch.

All these are matters which cannot be improvised quickly in war; whereas free flank communications for the infantry could then be rapidly opened up by the employment of numerous large gangs of civil workmen.

We must on no account omit the allied and equally important question of railway communications. In view of the large existing number of railways leading from the metropolis to all parts of our position, so that there is hardly any point in our line of defence which is more than 4 or at most 5 miles from a railway, I do not propose here any expenditure in the provision of special railway communication. But we must not lose sight of the important question of siding accommodation and approaches to the points where troops and stores would have to be landed from the various existing railways. Also special provision is necessary for dealing with and finding temporary accommodation for heavy goods and stores of all kinds. Otherwise the great value and importance of all these railways will be to a great extent marred and spoilt in war-time for want of such a provision.

Thirdly, in connection with the same question of communications, we must not forget the telegraphs. Although the ordinary civil telegraphs of the country have been greatly extended of late years so that they give us a good basis to work upon, and especially as regards telegraphic communication to and from the metropolis, yet much more will be required to supplement them. We require complete telephonic and telegraphic communication all round the position as well as to and from the permanent magazines and the special sidings or railway depôts.

It seems very necessary that these three questions of roads, railways, and telegraphs should be considered and dealt with as part and parcel of one general question and under one single governing authority. Otherwise much money might be spent to little advantage. Thus it would clearly be of little use that a railway company on receipt of a subsidy from the Government should provide any amount of special siding accommodation to enable men and stores to be landed at a point on its line convenient to our line of defence if there were no road from thence in the required direction. The question of whether such a road exists or could be got by improving an existing country lane, or must be constructed, must evidently be considered and dealt with at the same time as the siding and platform accommodation question. And the situation of our nearest proposed main magazine and its communication must also be considered simultaneously. All these matters could best be referred to and dealt with by a mixed Commission or Committee of Staff, Transport, and Engineer Officers, assisted by experienced civil railway managers or officials from the various leading lines, and from the postal telegraph departments.

It is clearly impossible here to procure any proper estimate of the sums required for these various purposes. It would be necessary that such a mixed Commission as I have suggested, consisting of able and experienced Officers and specialists, should spend months in a careful and deliberate enquiry before they would be able to say where the existing roads are fairly sufficient, where and to what extent they should be improved by widening or remodelling them, where new roads are essential, and where a special outlay on railway depôts or telegraphs is most required.

I propose, however, to allot the sum of 400,000*l.* to these various requirements. It must be understood that it is not here contended that this sum would suffice for all that is desirable or theoretically necessary in these most important matters. But I believe that it would reduce the very considerable amount of work that would still remain to be done whenever an invasion is imminent or in progress to such a moderate and manageable quantity as might fairly perhaps be left to take its place with the rest of the war preparations for defence. The judicious and careful expenditure of such a sum in time of peace would be of enormous value in war. It would give us such a provision of the most necessary road, railway, and telegraphic communication all round our position as would immensely facilitate and go far to secure the proper supply of our troops with all necessary provisions, ammunition, stores, and munitions of war. Also it would provide for an easy and rapid flank movement of the whole force, which is most essential.

Before we leave this part of the subject let me again insist upon its great importance in connection with the allied and collateral question of the decentralization of the supply of stores and munitions of war generally. Our existing system is based upon peace requirements and considers only the most advantageous and economical peace arrangements. I believe I am justified in saying, and that all those members of this Institution who have studied the question will bear me out in saying, that in case of a great war and the invasion of England, calling for the urgent supply of arms, ammunition, equipment, warlike stores, and provisions of all kinds on an enormous and unprecedented scale, we are in danger of the most hopeless and ruinous block and confusion.

We may have such a scene of disorder as will rival or eclipse the memory of the block of stores on the French railways in the Franco-German war. There, as is well known, miles of trucks, loaded with every necessary and unnecessary description of stores, blocked the large siding accommodation of the French railway depôts, and no one had the slightest notion of what was inside them. So that Officers in command of troops close by were sending the most urgent and despairing telegrams to headquarters for these very stores, in order that still more truck-loads of them might be dispatched, only to increase and multiply the existing confusion.

In case of England being involved in such a great struggle, it will clearly be impossible for the Commissary-General at Woolwich, with his staff, to attend properly to the urgent telegrams in connection with the supply of stores, which under our over-centralized system will pour in upon him by the hundred from all quarters. For wherever the British flag flies all over the world, urgent requirements will then develop themselves.

It is in view of such considerations as these that, starting with the idea of spending the least possible money, and making the most modest possible demands, I have yet been led to propose the expenditure of a large sum, more than half my total estimate, in the provision of well-appointed magazines, wherein all necessary ammunition and stores are to be permanently stored at short intervals all round

the selected position; also in opening up good communications whereby the rapid supply of these necessary munitions to the troops and guns who are to use them is provided for, and in the provision of a good substantial basis of road and railway accommodation and transport, whereby the supply of the army generally and its rapid flank movements in any direction will be facilitated and ensured. I now invite your consideration of the absolute necessity for these proposed arrangements.

Given the men and the powerful force of artillery and machine-guns, and a good supply of ammunition and all necessary tools and stores for organizing a strong defensive position actually on the spot, ready to hand, with flank communications well provided for, and there is not a General in the British Army who will not see his way to make a good defence, and meet any possible invader in a cheerful spirit. But our ablest Generals will, it is to be feared, assume the responsibility of command at such a crisis with a heavy heart when they know that long trains of ammunition have to come from a distance over roads or railways already fully occupied with the transport of troops and necessary provisions, and have then to be hauled across country with infinite labour and delay to the batteries and trenches; when they know that the reserve ammunition for a second day's fighting may or may not be forthcoming, and that when, after infinite pains and trouble, everything has been got together for a good defence at the threatened point, it is very doubtful how far, in case of a flanking movement of the enemy, they themselves will be able to move and to organize a defence elsewhere.

I submit, therefore, to your judgment that whatever be the exact position which it is desirable that our field army should occupy for the defence of London, and whatever view may prevail as to the necessity or advisability of fortifying this position in a regular way, this point at least is perfectly clear, that the preparation now in time of peace of such arrangements as I have indicated above for the supply of ammunition and warlike stores of all kinds, and for rapid transport and free communication in time of war, is a matter of the very first necessity.

(VI.) Let us now abstract for convenience an estimate of the approximate cost of these proposed arrangements. This is as follows:—

Permanent Works.

Twenty magazines at 5,000 <i>l.</i>	£100,000
Road-making and road improvement, including forming permanent depôts on the nearest railways, with special siding accommodation, also telephonic and telegraphic communication to the magazines, and along the position	400,000 ¹

¹ I observe in passing that this 400,000*l.*, most of which would be spent in road-making and road-improvement, represents a most valuable resource for providing useful and important public work for our distressed operatives in severe winters. If all the necessary plans were drawn out in readiness, how could 400,000*l.* of public money be spent to better advantage than in alleviating such a season of distress as occurred last winter by providing this work for them?

Brought forward	£500,000
Movable munitions of war: 180 guns, new 4-inch breech-loaders, complete, except horses, with 100 rounds of ammunition per gun, and all necessary stores; 300 powerful machine-guns complete (except horses), with 10,000 rounds of ammunition per gun, and all necessary stores. Supply of stores for the magazines, namely: Sandbags, entrenching tools, artificers' and woodman's tools, iron wire, iron gabions, gun cotton, land torpedoes, electric mines, and miscellaneous small stores	400,000
Total	900,000

I would observe on the above table, that I have increased my original estimate of the cost of stores and munitions of war for the magazines, in view of the immense advantage, from the point of view of our national defences generally, in having these twenty magazines all round London, and in easy communication with its network of railways, well supplied with such stores. For so long as we have no central nor second arsenal to assist, or if necessary take the place of Woolwich, and assuming that I am not altogether mistaken in my views above as to the probable congestion and block in supply of stores and munitions of war likely to be created by the exigencies of a great national emergency, it is clear that the existence of these twenty well-filled magazines would be of the utmost value, quite apart from the direct defence of London.

Thus suppose, instead of marching immediately on London, an enemy were to land somewhere in the north or west, and force us by his ravages to take up a position at some convenient point far from London, to stop his progress. A large issue of these most necessary stores could then at once be made from those magazines on the north or west side of London which are nearest to the required railways. These would be forwarded forthwith in aid of the local resources of the military district in question. They would then be replaced from Woolwich at leisure. The saving of time by this course might easily be of the most vital importance to the defence. For this and for obvious reasons of convenience it will be well that some of the magazines should be placed as near as possible to and in close connection with the special sidings to be formed on the leading railways, and these magazines may with advantage be larger and better filled than others. The estimate for their construction might be increased to 6,000*l.* or 7,000*l.*, the extra sum being saved for them by a reduced expenditure elsewhere.

I have included no small arm reserve ammunition in the magazines in peace, since it would deteriorate. But a large supply should be forwarded to them immediately on the outbreak of a serious war when invasion seems possible.

It is hardly necessary to call attention to the smallness of this sum of 900,000*l.*, as compared with the enormous magnitude of the interests at stake. Viewed as a question of insurance to the property and

trade of London, it is an extremely moderate amount. But when regarded, as it should be, as a necessary insurance on the wealth and trade of the whole British Empire, and on the welfare of all the millions of people who compose it, it is altogether and absolutely insignificant.

(VII.) Having now, as I venture to think, laid such a foundation in time of peace as would enable us to organize a very powerful defence at the shortest notice in war, let us next proceed to consider whether any special measures should be taken for strengthening and improving these defences by temporary or provisional works to be constructed rapidly whenever the occasion may arise. These works would be extra to and beyond the ordinary field works or measures necessary and usual for establishing a defensive position. I am very strongly opposed to trusting the defence of London in any large degree to special provisional works to be thrown up under the tremendous pressure and amid the confusion and disorganization which it is to be feared may prevail during an invasion or attempted invasion of England. For such over-pressure and confusion will be only the natural correlative and consequence of our present state of supineness and unpreparedness in these matters, and are therefore to be expected. Nevertheless, it does not follow that given such a substantial nucleus or basis of defence as I have endeavoured here to advocate, provisional works thrown up on the outbreak of a serious war will not come in as a very valuable adjunct and auxiliary. I submit that they will, provided we frame our scheme for them in accordance with the following principles which seem to me to be essential. These are—

(a.) The works should be of the most moderate and manageable dimensions admitting of very rapid execution by gangs of civil workmen.

(b.) They should be of the utmost possible simplicity of design and construction, so that any contractors' foremen or overseers who may be employed in charge cannot well go wrong in them, and will require only a minimum amount of skilled supervision.

(c.) The works should be adjuncts and auxiliaries to rather than an integral and indispensable part of the general scheme of defence, so that the position will be complete and perfectly defensible without them, and no confusion or disorganization will be caused by their absence if after all from any cause they should not actually have been completed in time.

(d.) The plans, the bills of material and quantities, and every detail connected with the construction and proposed arrangements for the execution of these works should be carefully drawn out in peace and printed or lithographed in a convenient form for distribution and reference.

(e.) Provisional contracts based upon the information so supplied should be drawn up and signed with the most substantial and trustworthy firms of contractors and large employers of labour whenever a declaration of war is imminent or immediately upon it. On receipt of an order by telegraph to go on these firms can then proceed forthwith with the execution of the work without the loss of an hour.

If these conditions are adhered to, and the whole affair reduced to the simplest elements on the most moderate scale so far as any individual contract is concerned, we shall ensure, so far as can reasonably be ensured, that the works will be finished in time. And even if from any cause they are not then forthcoming our defensive position will not be crippled or marred by their absence.

To meet the above conditions the best form which our provisional works can assume would be, I think, as follows:—

(a.) Powerful blockhouses or caponiers should be constructed in front and immediately under the fire of the main position. These would allow us to place some of the machine-guns which we have already provided in secure and commanding positions, stronger than but similar to the slighter and more temporary field constructions which have been advocated above. These caponiers would entirely give up direct fire, otherwise they might be knocked to pieces by the enemy's field-guns. Their general and typical form would resemble the letter T, the head of the T representing a thick bank or traverse of earth parallel to the general front, and quite impervious to the enemy's shells, with an easy slope towards the front and a strong revetment of stout timbers in rear. The body of the T represents the caponier proper, traced at right angles to the general position so as to sweep the front with a flanking fire. It would be at a low level under the lee of the much higher earthen traverse, which would project well beyond it on each side to secure it from oblique fire. It would consist of large logs and rifle and shrapnel proof steel or iron plates, with a roof of thick oak logs or railway bars covered with earth, and impervious to the enemy's shells. These caponiers would be screened from the enemy's view as much as possible by being placed behind woods, buildings, or other cover in addition to the direct protection afforded by the earthen traverse. They might be surrounded by an obstacle such as a good wire entanglement to prevent the enemy closing on them. They would mutually support and flank each other, as each would sweep the immediate front of the next and the obstacle before it, at an easy and effective range. They would not come into action at all until the enemy's infantry advances in force to storm the position. They would then suddenly open upon him a flanking and oblique fire with the most deadly effect.

The only case in which they would undertake any direct fire on the advancing enemy would be as before in a few places where it might be desirable to sweep a special locality such as a road, bridge, or causeway leading on to the position. They would then be carefully masked and blinded and reserved for this particular purpose. So they would not open fire till the latest moment, when they could do so with the most effective result on this special line.

It will be impossible for the enemy to pass this line of flanking caponiers as long as the machine-gun fire from them remains effective. And they will receive such efficient protection from the high traverses in front that it is extremely difficult to see how he is going to attack them.

He cannot close on them without surmounting the obstacle under

a torrent of fire from the collateral caponiers on each side as well as from the artillery, machine-guns, and infantry on the main position in rear, where special provision should be made for concentrating an overwhelming amount of fire on and around each caponier for its protection.

They would be further strengthened in most situations by cutting a ditch around them to prevent the enemy from closing on them in case he surmounted the obstacle. Or the ditch could be placed under a wire entanglement as part of the obstacle.

Before we leave this subject I would express my conviction that this whole question of reserved defence—by aid of machine-guns reserved for flanking and oblique fire only and well traversed from the enemy's artillery—is very important and admits of great future development. I venture to predict that that Power in Europe which first grasps its true importance, and adopts a good system for turning it to account, whether by means of hasty field constructions or by provisional works, will be likely to gain a very marked success in defensive warfare.

(b.) Any further expenditure of money and means on provisional works I should propose to apply to constructions of a larger and more elaborate character placed neither in nor in front but in rear of the firing positions or main line of defence, whenever the ground may favour such a position. Here a row of strong redoubts might be constructed if time permit. Just at the moment when after a long struggle and very severe fighting the enemy has, we will suppose, succeeded in forcing all our front line of defences, and arrives pretty well exhausted on the crest of the position, he will then find a line of strong works in front of him. These being retired for the most part behind the crest of the main position will not have suffered much from the enemy's artillery in all the first part of the fight, and will be in good condition. As he cannot pretend to pass them without bringing up a strong force of artillery to silence them he must necessarily come to a halt, and time will be given to bring up reserves, to re-form the defenders in rear of the redoubts, and to renew the fight with their powerful support. This arrangement would be better, I submit, wherever the ground is fairly favourable to it, than the placing the redoubts in the front line where they would be a target for the enemy's guns all through the day, and where the length of front which they would occupy would be better allotted to the usual open batteries for the guns and to trenches for the infantry. And more especially we should thereby avoid any chance of being caught by a rapid advance of the enemy in the middle of their construction when they would be prejudicial to the defence. For a line of good completed batteries and trenches of the usual field profiles are far better than a set of half-finished redoubts.

(VIII.) We will now say a word upon the question of time for the construction of such works as these.

And here a very important consideration comes in, which I have already alluded to in the first part of this paper, and to which I again invite your special attention.

It is this, that the more complete our preparations in peace may be, the more time we are likely to obtain to add to and strengthen those defences in war. For as our defensive preparations become stronger, the stronger the force which the enemy must send against them. And from the conditions of the case, and especially from the over-ruling necessity for sea transport, the stronger the force which the enemy has to send against us the more time we shall be likely to gain before he can actually appear in front of our position. This consideration applies to every stage of the question of invasion, but as I have above pointed out it comes in with special force at the point at which any possible enemy is obliged to give up the idea of capturing London by a *coup de main*.

This point of security I believe that we have already fully reached by that amount of peace preparation which has been advocated above, quite apart from and independently of any aid from these provisional works, whether small or great. But deferring any discussion of this point, it is undoubtedly safer to arrange to strengthen our defensive position if required with some works at least which can be executed in time for any probable contingency. Hence the first description of provisional works above—the flanking caponiers in front line. These are so extremely simple and easy of construction that I have no doubt that plenty of substantial firms could be found to contract for the construction of any reasonable number of them within a week from the order to commence, under stringent guarantees against exceeding this time. Whereas under no circumstances that would appear to be reasonably possible would less than ten days or a fortnight be available.

I must here, however, digress for a moment to say that I am assuming that to meet such a serious war, instant and decided measures will be taken to secure the portion of the coast between the mouths of the Thames and Medway on the south and Harwich on the north, including the Blackwater. This question will be considered in my next paper. I will only observe now that if this portion of our coast be neglected, the enemy may be in London before we have time to think about provisional works or anything else. But assuming for the moment that it must and will be attended to, we ought then under no probable circumstances to secure less than the ten days or a fortnight above for organizing and completing our defensive line with its provisional works. This will amply suffice for the flanking caponiers, but not for the redoubts. The time required for the latter will, of course, depend mainly on the exact profile and construction adopted, as they may be given any section from a field work capable of being completed in three days up to that of a first class fortress. Provisional redoubts of only moderately strong profile are what I have here in view. They should be large and roomy, well supplied with powerful artillery and numerous machine-guns, so as to make up in volume of fire for their deficiencies in strength of profile. They could probably be constructed and armed in a month or six weeks according to the ground and the circumstances of the case, provided the designs and special

arrangements for the most rapid construction are carefully worked out beforehand, and provided the work be pushed on continuously day and night from commencement to finish. We cannot reckon upon them to meet any sudden attack, nor are they necessary for the purpose. But they will in all probability be ready in time for those more leisurely and extensive operations on the enemy's part which, if the views above put forward are sound, our first established line of defences will have forced upon him. In proportion to the strength of these secondary defences again the scope and magnitude of the enemy's operations must be enlarged, his transport in artillery, and shot, and shell, especially will be greatly increased, more time will be gained to strengthen and extend the defences on our side, or to establish a second or inner line of defence in aid of them on the threatened quarter.

(IX.) With such arrangements as I have advocated for preparing leisurely in time of peace the most indispensable elements and conditions necessary for enabling us to complete very rapidly in time of war a strong line of defence for London, and further with well-matured plans for strengthening this line by provisional works whenever the occasion may arise, it would apparently become a question very open to argument whether the permanent fortification of our capital may not be dispensed with altogether. At least it might be deferred until many other pressing requirements in connection with our defences, whether naval or military, have been attended to. These questions will be discussed in my next paper. But I ask you particularly to note that there is nothing whatever in my proposals to interfere with the proper construction of a line of permanent works whenever the money may be forthcoming. On the contrary, every penny which would be spent now in time of peace, supposing these suggestions were carried out, would be so much to the good, and would represent so much useful work done towards, and in connection with, the permanent defences.

For the powerful guns of position and machine-guns, which it is here proposed to provide, would be the very things of all others which would be the most required for the defence of the long intervals between the forts, and to supplement and support these permanent works. And the magazine accommodation and special provision for communications would be most necessary and important in any case, and whether the forts are to be constructed or no. Instead, therefore, of being in any way antagonistic to, or interfering with, the permanent fortification of London, whenever the Government may recognize its necessity, my proposals may rather be regarded as leading up to, and paving the way for it. Meanwhile in the present they provide us with a strong defensible position, calculated effectually to prevent the capture of our capital by any force which an enemy could reasonably undertake to run across the Channel and march rapidly upon it for the purpose. And in the future they provide us with a solid basis of defence capable of being supplemented and strengthened hereafter by suitable works, whether provisional or permanent, to any required extent.

(X.) I would now invite you to consider the leading tactical idea on which my whole scheme of defence is based, with a view to examine its soundness.

It is a maxim of the greatest master of modern warfare, Napoleon, which Captain Mayne, R.E., has wisely adopted as a motto for his valuable work on infantry fire-tactics, that "fire is everything, the rest is of small account." We shall entirely throw away the one great advantage of our position on the defensive on our own soil if we do not take the most decided measures for establishing and maintaining a decisive superiority of fire all through the fight. This idea should dominate and govern all our arrangements; and if we will only carry it out thoroughly and consistently, utilizing our great resources as required for the purpose, it is bound by every reasonable calculation, and so far as human foresight can go, to secure us the victory.

Let us take then this idea, that we must before and beyond everything else seek to establish and maintain a decisive superiority of fire of every kind throughout the fight as our guiding star, and see what it means, and whither it leads us.

It leads us to the occupation of a position forming part of a continuous circle of defence round London, such as has been detailed in the first part of this paper, because in no other way can we make sure of having on the spot at the right time the necessary array of guns and ammunition required for such a superiority. It leads us to the armament of this position with a special local force of guns of position and machine-guns to give us a decisive preponderance of fire in the two critical and all important periods of the artillery duel and the enemy's close infantry attack. It leads us to the establishing now in peace of good permanent magazines at moderate intervals all round the position to be filled with the necessary ammunition and stores. In no other way, as I contend, amid the turmoil and confusion of such a crisis, and viewing the immense pressure certain to fall on our Store Department, can we make quite sure that the large supply of heavy ammunition which will be necessary will then be on the spot. It leads us to the storage in these magazines of a large reserve small-arm ammunition supply, so as to ensure that in a protracted and desperate struggle our troops will never fail of an abundant supply of ammunition. It leads us to the opening up of good communications to enable these guns and this large supply of ammunition to be moved as required from point to point of our extended position with rapidity and certainty. For I should give our troops not less than 500 rounds a man, and sweep the ground in front with a storm of bullets from the time the enemy comes within the extreme range of the rifle. Let us use every known method and precaution to ensure that the ammunition shall be expended to the best advantage, but let us fire away. Only let the bullets go to the front, and a proportion of them depending, do what we will, very largely on the general law of averages, must and will find their billets. Thus you will see that, viewed in the light of this ruling principle, the leading arrangements which have been proposed for the occupation of the position are fully justified.

And I now submit to your judgment that they are sufficient. I am not careful as to the exact number and nature of guns or machine-guns which are to be employed. These are debatable matters of detail. All I contend for is, that whatever number of such weapons our most experienced Officers may decide upon as necessary in addition to those we now have available, in order to give us a decisive superiority of fire over any number which the enemy can reasonably be expected to bring into the field against us, those weapons should be actually in the hands, either as has here been suggested, of our London Artillery Volunteers, or of some other troops. And the ammunition for them should be actually on or near the spot, so that we may be quite sure that it will be there when wanted.

If this be done, consider the position in which the enemy will be placed. He will have to advance against a formidable commanding position under a tremendous fire of large shrapnel from numerous and powerful guns of position firing at known and measured distances from the moment he comes within their range, or, say on a clear day, 4,000 yards. This shell-fire he cannot reasonably expect to silence or to cope with effectually with his much lighter field-guns. He then has to advance in the open well in view of a high and commanding position, over cleared ground, under a tremendous hail of long-range fire from our infantry posted behind earthworks, and supplied with practically unlimited ammunition. To this his moderate supply of ammunition will alone forbid his replying to any purpose. When he advances to the close attack with decimated troops who have already been under a heavy and continuous fire for at least 2,000 yards, he will be met not only with a hail of lead from our entrenched infantry and machine-guns firing directly, but with a steady stream of flanking-fire from machine-guns firing from protected emplacements under the lee of thick traverses which effectually screen them from his artillery. Without reckoning any aid which we may derive from well-known auxiliary defensive appliances such as mines, land torpedoes, obstacles, &c., if we cannot hold our own in a position so armed we can hardly expect to hold our own anywhere at any time.

Is the struggle then to be purely defensive on our side? By no means. We should regard all this multiplication of defensive power as merely paving the way for and leading up to a vigorous offensive. To this end we ought to keep our best trained and most mobile battalions massed together by strong brigades, Divisions, or even a whole Army Corps if you will, ready to assume such an offensive whenever the right moment may arrive. The one great advantage of our strong defensive position, unlimited supply of ammunition, and multiplication of defensive or retaining power generally, will be that these will enable our lesser trained or almost untrained troops to hold their ground, and bring the enemy's progress to a standstill, over large sections of the position, while elsewhere we shall have our best trained troops kept well in hand for counter-attack on the largest scale.

(XI.) Moreover I contend that such a scheme of defence as this is in harmony with and follows naturally from a consideration of the

essential conditions of our position at present as compared with other European Powers. Their strength lies in enormous numbers of men, the result of enforced conscription. With us trained men are scarce and dear, but we lead the world in manufacturing capabilities. What folly then not to set ourselves to atone for our acknowledged weakness by utilizing and developing our acknowledged strength! We ought to multiply power, if not in men, then at all events in first-rate guns, machine-guns, and appliances of all kinds.

(XII.) Lastly, I ask you to note that the idea which underlies all these proposals is that of dealing with this great question of the defence of our metropolis on the principle of "*solvitur ambulando*."

Only let us make a beginning, a fair start on a well-considered and comprehensive plan, and the difficulties will vanish one by one as we proceed, and the whole question tend to work itself out to a satisfactory conclusion. For let us suppose for a moment that the expenditure of such a modest sum as has been advocated above, under a million sterling, were approved of. The careful study of the ground all round London, and the laying down of a definite and authoritative scheme of defence which its due expenditure would involve, would alone be of the utmost value. The general line of the position having been once fixed upon, its proper disposition in detail would be systematically worked out both theoretically and practically. The different sections of it would form an admirable theme for the most talented young Officers, whether at the Staff College or elsewhere, to study and report upon. The actual occupation and putting into a state of defence of successive portions of it would form a most practical and instructive programme for our Volunteers to work at, or better, for mixed divisions of all arms of the Service to attack or defend at successive autumn manœuvres. A small number of the provisional caponiers, or blockhouses, could be constructed from time to time at important points, in connection with the manœuvres, sufficient to establish practically the best design and most rapid construction for these works. The all-important question of the best means of meeting a turning or outflanking movement on the enemy's part, which we shall revert to later, could be well studied for each different section at such autumn manœuvres. By degrees and by such combined theoretical and practical studies on the ground, the exact circumstances and capabilities of every portion of the position, its strong and weak points, and the portions and particulars requiring special attention on the outbreak of war, or a further moderate outlay in peace, would be thoroughly well worked out.

Any General Officer who might suddenly find himself called upon to assume the tremendous responsibility of defending London against an invasion would then, I contend, find himself in a position out of all proportion more favourable than at present. He would find ready to his hand a well studied and well understood position, special railway sidings and roads suitably disposed for getting his troops and stores conveniently on to it, telegraphic and telephonic communications everywhere round it, good permanent magazines at short intervals all along it, containing cartridges, shell, small-arm reserve ammunition, tools,

stores, and every necessary auxiliary appliance for establishing a strong defence. He would, find in addition to the arms at present available, a most powerful special force of splendid guns of position well supplied with ammunition wherewith to overpower and silence the enemy's artillery, and a formidable array of the best machine-guns for establishing a strong reserved defence against their infantry attack. He would find Officers of his Staff already well acquainted with the position, troops previously practised and handy at the necessary works, and a host of skilled civil workmen ready to execute auxiliary works of defence on simple and well understood designs as well as to assist as required in the opening up of roads, the rapid construction of strong emplacements for the guns of position, clearing the ground for fire, or any other necessary preparations.

It is, I submit, beyond all reasonable question that with such advantages as these, so strong a defensive position would be established that no enemy could afford to run the tremendous risk of attacking it with such a force as he could pretend to run across the Channel for a sudden attempt.

But if abandoning the idea of a *coup de main*, a more leisurely and deliberate attack is to be made with much larger forces, and with a much greater concentration of guns, materials, and appliances, then the conditions are still all in our favour. For in gaining thereby the one indispensable element of time we gain everything. As the enemy multiplies men, means, and appliances for the attack, so shall we multiply them for defence, and in a greater ratio. For he has to bring everything across the sea subject to unknown risks thereon. We have lost the command of the Channel indeed, but as long as we have a fast steaming vessel of any sort left, and a bold crew, we can attack his transports. And we have all the enormous resources of London, the capital of the world, immediately in our rear, and all the highly concentrated power of England in direct and immediate communication by railway and telegraph wherewith to fortify and man our position. And so the invasion of England and capture of London will work out step by step to a larger and larger affair, requiring more and more expenditure of men, money, means, and time, and giving us on our side more and more scope for turning our vast and highly concentrated resources to account. In fact the struggle will tend rapidly to resolve itself into the question of whether the whole strength which an enemy can undertake to bring across the sea can contend with the whole strength of England on our own ground. This is all we require and all we ask. For once let the great latent strength of England be brought fairly into play and we have no fear for the result. To secure this we ought now, by a most moderate immediate expenditure in time of peace, to lay at least such a sufficient basis and nucleus of defence as will secure our capital against a sudden attack and pave the way for further defensive measures when required. And I once more call your attention to the all-importance of this as being the indispensable groundwork and cardinal necessity at present. For without it we have absolutely no security whatever that, at some crisis favourable to an invasion, we shall not see all our

defences turned, our capital captured, and the British Empire ruined by one sudden and bold stroke, before we have time to bring our great latent resources into play.

The CHAIRMAN: We are favoured this afternoon with the presence of an Officer who has had very much to do with this matter. I refer to Sir Charles Nugent, who perhaps will be good enough to favour us with some observations upon this very valuable paper.

Colonel SIR CHARLES NUGENT: Sir Andrew Clarke, ladies and gentlemen, possibly I should not have said anything on this subject had not the lecturer said that this is my map, and that that double line is the line I propose for the defence of London. In one sense this is true, but the double line does not represent all I took occasion to propose when I prepared this map, for in my project for the defence of London I included certain arrangements for the defence of Tilbury and the defence of Chatham, and I held the Thames with armed strength both above and below London. Of course the object of rising in this theatre is discussion, but on this particular subject I would rather deprecate discussion. It is possible that I and others here may not agree with all that the lecturer has said as to the scope of invasion. We may think, perhaps, that there is not sufficient distinction between a mere dash at London and an incursion, however sudden, with a view to subsequent and more prolonged operations if the incursion proved successful, or to a general and deliberate invasion. I may say generally that I agree with the lecturer as to preparation in time of peace; I agree with him as to decentralization, and as to the establishing communications. I agree with him in making certain arrangements for the provision of ammunition of all sorts. But with regard to the general line which is fathered on me I would only say this,—disclaiming that I am any authority,—that I have spent the intervals of a good many years upon the defence of London and of the coast. I have walked all round this position over and over again, and indeed I have walked at intervals along the whole coast from Harwich to Portsmouth; there is, however, an Officer here who, I believe, shares pretty much the same view of it as I do, and who has spent even a great deal more time on it, I mean Sir William Crossman; and although in my own mind I may be convinced that that is the best position, that no one particular position is an absolute necessity, that you may make, by the manner in which you treat it, one position as good or nearly as good as another, and so without at this time pinning myself to any particular position, and without giving reasons or mentioning what accessory things I consider necessary, I think the lecturer has done good service in calling attention to the necessities for defence of London. So much for the theoretical aspect, ladies and gentlemen. Now I would like to say a word or two upon the practical aspect of this matter. If I may venture to predict, following the example of the lecturer, I would predict that—I mean no disrespect to you, Sir—when it is all over the Chairman will get up and will say, “Well, ladies and gentlemen, we have heard a very interesting lecture, ah, a very interesting lecture indeed! It is impossible to exaggerate the importance of this subject. I think, ladies and gentlemen, we had better give a cordial vote of thanks to the lecturer;” and we shall give it. This will happen again next Friday, and then we shall go home and shall feel satisfied, with a virtuous satisfaction, that we have done our part—that there is an end of it. But have we done our part? Is there an end of it? Shall we not be rather in the position of the man who said he would and didn’t? Really when I reflect on the numbers of occasions, here and at other places, on which I and others have advocated this defence of London, I feel somewhat in the position of a man, I grieve to say it, who has lost the fight, though I cannot say like the proverbial man who loses the fight that I come up smiling. When I think of the number of times that this has been repeated, I cannot help thinking what an idiotic fool John Bull is; people say it is part of our Parliamentary system. I am not going to talk politics, Sir; politics are wisely prohibited in this Institution; but I may ask you, ladies and gentlemen, and I do ask you, can anything be more idiotic than the mode in which we administer military and naval affairs? This lies at the root of this matter. Why, I can recall nothing but alternate hot fits of expenditure and cold

fits of economy, and what is the end of it? Do you think it leads to efficiency? Do you think it leads to economy? It leads to drifting, waste; it leads to inefficiency, it ends in a policy of "let it alone." But is this the end? The lecturer, perhaps, in the next lecture will tell us what the end will be. In considering the composition of the War Office, an outsider might reasonably expect that its three or four well-paid official chiefs should know something about military matters. He might not unnaturally think, "Oh, this official must be a General, and he of course knows all about guns, and drums, and wounds;" but what is the actual fact? Exactly the reverse; and I ask any man who has had any experience of the War Office for the last fifteen or twenty years, how many Secretaries and Under-Secretaries of State or Surveyors-General have got into their places—places in which they could do unlimited good, but in which also they may work irreparable harm—as a consequence of their special knowledge or ability? Would they have been in them had it not been for their connections, or would they have been in them had it not been to satisfy the interests of party? I recollect in this theatre when discussing the question of Colonial matters, and having to consider the action thereon of the Colonial Office, an Officer who was present made a remark which impressed me as very sensible; he said, for his part he would never have a Secretary of State for the Colonies if he had not seen something of the Colonies. And so say I with regard to the War Office. It is all very well to fall back upon the dual government of the Secretary of State for War and the Commander-in-Chief, and imply a responsibility upon the part of the latter which is not his; this lands you in absurdities. There should never be a Secretary of State for War or officials alongside of him who do not know something of their business. Again, let me refer to the Admiralty. I am not saying anything about this or that side of government, nor am I reflecting upon individuals, I am criticizing the system which prevails in our benighted country. What is there in the Navy which differs in essentials from the Army? Both use the same guns, both use the same locomotive power. Sailors are men as are soldiers, of the same flesh, and nourished with the same food. Tactically the same system is employed; why should the system of administration be different? At the Admiralty there is a Board. Is a Board the right thing? Then let us have a Board at the War Office. If on the other hand the Secretary of State, one-man government we will say, is the right thing, then let us have one-man government at the Admiralty; one or other must be right, both can't be right. Can affairs prosper when administration is in such fashion? They cannot. It is all very well for Major Elsdale to come here and lecture; what comes of it? Nothing, because the official mind takes no heed. The Services are one, and but one, of the battlegrounds of party government. What does party government for us? What has it done for us? We may well say what. Look to a neighbouring island and you shall indeed in sad sooth see, in the result of the long season of restrictive and sentimental policy, *one* of the results of party government; and to-day's paper, with its accompanying discussion, will go abroad, and talk here as you and I may, nothing will come of it; talk we ever so wisely, nothing will come until we change this party system of England, and we can do it, mind you! There are many of us now under the new regulations who have gone or are going into private life. There are many, not the worst, of both Services with nothing to do. As a large and very increasing body, and yielding in patriotism to no other, we ought to make our voice heard in Parliament; we can combine to force our views on the electors, and we should. I (and others better than I before me) have been fifteen years engaged upon this matter of defence, and here to-day we are as we were fifteen years ago, and some of you, I fear, will see that period lengthened twice or thrice if we do not put our shoulders to the wheel and show ourselves thoroughly in earnest.

Captain C. B. MAYNE, R.E.: Sir Andrew Clarke, ladies, and gentlemen, I should like to say a few words in opposition to the principle underlying Major Elsdale's able paper, the necessity of fortifying London before anything else is done. The fortifying of London is certainly an important point, but the question is, whether it is the main one? I have read a great number of papers and books on the defence of the kingdom, and what has struck me more than anything else is the way in which ideas crystallize around a single town, though the chief one of England, as if London was England itself. The only exception to this rule was the

Defence Committee of 1859, who pointed out that the fortifying of London was a secondary consideration to that of fortifying our naval arsenals and dockyards, as without these the defence of the kingdom was paralyzed, even if London held out, while with them the defence could be carried on even if London fell. This principle still applies, but none of our naval arsenals and dockyards are in a condition to resist a land attack, Chatham being totally undefended; and Portsmouth, Plymouth, and others incomplete, either in forts or guns or both, or in ammunition. Our rich commercial ports all along the coast are all open to attack by cruisers, and the French have given us fair notice of what they intend to do, especially Admiral Aube, now their present Minister of Marine, who has openly said that the French are "going to attack all our coasts if they have war with England." Another reason why the fortifying of London is a secondary consideration is, that all past history shows that in national wars the conflict has been decided by the defeat of armies in the field, and not by the capture or cutting off of the capital. The same applies to England. We first want an army sufficient in numbers, efficient in discipline, and complete in artillery, cavalry, transport, equipment, &c., and capable of rapid mobilization and concentration. But though our home army is fairly strong in numbers, the mass of it is not nearly efficient enough in training and discipline to meet a Continental foe; it is incomplete in field artillery, cavalry, equipment, transport, &c.; and rumour says that no mobilization scheme exists, as the one drawn up some fourteen years ago was impracticable. We have only a full complement of field artillery for three out of our eight home Army Corps, while we have not sufficient organized transport for two Army Corps. Nothing has occurred since 1883 to alter what Lord Wolseley then said, that we could not in twenty-four hours scrape together more than 30,000 men and bring them down equipped to resist a sudden landing, and that the most we could put into the field, after some months, would be only 70,000 men. Further, field armies require secure bases, magazines, and lines of communication. At present London is the only base for our Army, and is in the heart of the probable theatre of operations, and its unsuitability for the purpose was recognized twenty-seven years ago, when the War Minister of the day wrote to the Defence Committee and said "it had been decided" to form a second arsenal distinct from Woolwich; yet this has never been carried out, although the Defence Committee proposed an arsenal at Runcorn, near Birkenhead, and a central dépôt at Cannock Chase. The admirable reasons for these selections still exist, while the creation of magazines all over the country so ably advocated by Sir Edward Hamley are urgently required, as also the decentralization of Government and private factories for field-guns, small arms, powder, and ammunition to enable a rapid, offensive war to be carried on by our home armies. The main reason why the French held out so long in 1870-71 was that from the decentralization of their supply establishments, they were enabled to arm and equip fresh levies, even after Paris was surrounded.¹ If everything had been concentrated in Paris as they now are in London (except a small rifle manufactory in Birmingham), this prolonged resistance could not have been carried out. Another point which strikes one in reading works on the defence of England is, that all nations speak of our Army standing on the defensive. From the small extent of our country and from the immense number of people that would be thrown out of work by the stoppage of our manufacturing trades, war in England could not last long, and even a superficial glance at the past invasions or attempted invasions of the United Kingdom will show that sharp, quick, offensive operations in our country have been the successful ones, while those that stood on the defensive have been nearly always beaten; consequently, our mobilization and concentration should be such as to allow of this being done, but it is doubtful whether the scheme of 1872 would have rendered such an offensive war possible. But I must leave

¹ Under present conditions, if London were cut off, this could not be done, as all our supply establishments are concentrated around London. The mere cutting of the railways leading from London, therefore, would under present conditions paralyze the defences of the country; thus showing the urgent necessity for decentralizing our supply establishments.—C. B. M.

this point, as it is not one under consideration. What I wish to point out is, that if money can be got there are many ways, as things now are, in which it can be better spent, including the strengthening of our naval arsenals and sea forces, than in fortifying London. London itself does not include anything like the wealth of Great Britain, which wealth really lies in the north and west of England, in our great manufacturing districts; while the trade of Liverpool alone nearly equals that of London; and any plan of mobilization and concentration should take this into consideration. All the large banking and commercial houses of London have their branch establishments spread over the country. In these days of innumerable railways, steamship and telegraph lines, commerce is getting more and more decentralized, and the landing of a strong hostile force in any part of England would so paralyze the whole trade of the country that the cutting off and even capture of London would not add much to the blow an invasion would give. But under existing conditions, which can easily be remedied, London is the vital point in our national defence. Within its limits are included our only Government arsenal, and our only large and field-gun, small arms, ammunition, powder, and equipment factories; and if London were only surrounded partly by more or less stationary infantry and partly by roving bodies of cavalry and light infantry, cutting the railways to the interior, we should be in a very bad way. London, as a rule, barely contains a week's supply of the necessaries of life, and consequently such an investment, even if London were defended, would soon cause its fall, on account of the non-arrival of the immense daily fuel and food supplies required for its existence, and perhaps by the capture of the principal heads of its water supplies near Teddington Lock on the Thames. The supplies for London have, from all time, come in mainly from the centre of England, and on this account William I was enabled to reduce London by famine merely by taking up a position at Berkhamstead to the north-west of London, and Napoleon I is reputed to have intended doing identically the same thing if he had been able to put foot on our shores; consequently, without field armies to relieve London, no amount of fortifications would save it. In making this statement, the fates of Metz and Paris are examples.¹ If I may draw a conclusion, rather than fortify London under present circumstances I would remove the elements which make it of any primary vital strategic value to us, and organize public and private arsenals, factories for war material, depôts and magazines at the strategic points of the country. Chatham, Gravesend, and Tilbury should be made a vast bridge-head or rather tunnel-head to ensure the free passage of the Thames against the flank of an invader from the east or south, and our big gun factory at Woolwich should be given to the Navy and removed to some fortified post like Chatham or Portsmouth, at which our ships of war can receive their armament direct. But of all these things, a mobile and numerous field army is the essential point for the defence on land, capable of rapid mobilization and concentration, and complete with artillery, cavalry, transport equipment, &c., with full and well-placed fortified magazines and depôts of war material to rely on, and to obtain such an army instead of our heterogeneous one, composed of units of varying and often doubtful value. I hope that I may live to see the day, Sir, when we may have a militia conscription in the country before it is forced on us by a national disaster. Fortifications without sufficient troops to fight, both inside and outside of them, are like a dead body wanting the living or active spirit, and for moral, economical, social, and military reasons, an army raised by a conscription, universal as regards its application to class, is to me the best way of ensuring the requisite active spirit of offence required for the defence of our island home. It is not the knowledge of our fortifications that would deter a possible invader, but a knowledge that he could not hope to successfully compete with our

¹ Because Paris was provisioned rapidly and made a successful resistance in 1870, it by no means follows that London can do the same thing. The line of defence round Paris was 45 miles only, and included an area of a little over 100 square miles, with a population of rather over 2,000,000 souls. The proposed line of defence for London is 100 miles in length, and includes an area of 700 square miles, with a population of over 6,000,000 souls.—C. B. M.

field armies. This feeling, however, does not exist abroad at present, and no amount of fortification will create it, and until we can make Continental nations respect our field armies, we shall be in danger of invasion.

Lieut.-General Sir GERALD GRAHAM, V.C. : I think we are greatly indebted to Major Elsdale for a very valuable paper, and I only wish that the facts and arguments he has so clearly laid before us could be impressed with all their force upon the mind and understanding of the nation. I think the supineness and indifference with which this most important subject is treated by the country is a matter of regret. Taking the facts as they stand, if we assume that an invasion is possible, I consider, notwithstanding what Captain Mayne has just said, that the defence of the heart of the Empire is absolutely necessary. I think the examples adduced by Captain Mayne do not show the lesser importance of fortifying or protecting the capital. He would recommend as far as I understand a complete change in our military organization. I quite agree with him that we should have a vastly superior army if we had a system of conscription, but as you all know we have not got a system of conscription, and I think it would take an invasion to stir up the country to submit to it. Therefore we have to consider what we must do with the organization which exists and the means we have available. I congratulate Major Elsdale on the spirit in which he has treated this subject. It is said that every one should stick to his own trade. A shoemaker says there is nothing like leather, and an engineer says there is nothing like fortifications, but Major Elsdale has made the question of fortifications subject to other more important considerations. He has told us what we must admit, that the defence of the metropolis must be entrusted to the Volunteers, and with that in view, it is the duty of our Government to repose confidence in the Volunteers and to treat them properly. We must give the Artillery Volunteers the best guns. Nothing can be more absurd than employing Volunteer artillery to practise with obsolete guns. We must train our Volunteer infantry, we must encourage them to train for the defence of London. We should take as their model the organization that we have on board ship in case of fire, for we all know how every one is practised to run to his position on the first alarm. A ship is a thoroughly practical model; there is no possibility of considering what should be done after the fire arises, something must be planned out and arranged beforehand, every man must go to his post immediately and know what he has to do; he must take up the duty whatever it is, and that is what we want for the defence of London. Its very size and its enormous population make it more difficult to defend, as its enormous wealth makes it a greater prize—the greatest prize that an invader could possibly hope for. Captain Mayne has said that there are other points more important than the defence of London, that the country might fall even if London were held, but there is no single point in the whole country which could be carried by a *coup de main*, which would entail such a loss to the country, as London. We know that in the opinion of all competent authorities the fall of London would paralyze all our commerce, paralyze all the action of the Empire, and that such a thing must not be. We have heard from the lecturer that we must endeavour to protect London in the first place from a *coup de main*. It is an absolute necessity to protect London from a *coup de main* and the rest will follow; let us do that at least. Even supposing it be out of the question that there could be an invasion, it would be of enormous importance to us to know that the capital is protected; it would give the greatest confidence; it would be an incalculable advantage in a merely financial point of view. I believe if it could be really properly represented and brought to the minds of the people of the metropolis, they would subscribe the money now and it would be a good investment. I must say, considering the matter of the defence of this metropolis, and the enormous pressure of work that would arise on a sudden emergency, I pity the General Officer who would have to undertake it, unless every possible preparation that forethought and skill could devise had been made beforehand. The question of decentralization has been very ably dealt with—I believe that to be one of the most important steps to take in a defence. Major Elsdale has stated the extent of the provision of magazines, but he has said nothing about forts to protect them. I presume that we should have some provision for forts.

Major ELSDALE: I shall discuss the question of forts in my next paper: the

magazines and the ammunition on the ground are as far as I have got in this paper.

Lieut.-General Sir GERALD GRAHAM: I should have thought that they might as well enter into the second line of defence. The arrangements made by the caponiers appear to me to be admirable; the system of reserved flank defence is most valuable and important.

Lieut.-Colonel TOVEY, R.E.: I should like to say a few words as to the details of Major Elsdale's scheme. I quite agree with what he has said as to the importance of defending London. Judging from what one hears from naval Officers of the great deficiency in our naval strength, invasion can hardly be looked upon as altogether impossible in the case of a great war. I wish at the present moment, however, to speak only of the plan for the defence of London which Major Elsdale has brought forward in his lecture. He seems rather to shun recommending regular fortifications, lest it be thought that he must necessarily do so as being an engineer. Well, I am also an engineer, and of course one is always liable to have it said that one thinks there is nothing like fortification, as the shoemaker thought that there was nothing like leather; but I think this is a case in which that consideration may be neglected; for it appears evident that if the great capital of this country is to be defended, fortification is the best means for supplying that defence. The defence of Paris was a very great question in France from about the year 1820 to 1840, when the fortifications were actually built. It was discussed during these twenty years by French Officers of all arms of the Service. The discussion was not confined to the engineers, Officers of all branches of the Service were consulted, some of them Marshals who had seen service in the Napoleonic wars. Many different plans were suggested, but I think I am correct in saying that all agreed in recommending some system of permanent fortifications. Perhaps I may have misunderstood Major Elsdale, but his scheme, as pictured in my mind while hearing him, was a wide road along a circle of 100 miles in length and 30 miles in diameter round London, with open magazines every 5 miles, with no forts or fortifications, but with some form of caponier at intervals along the front. He has mentioned that he would entrust its defence to the Volunteers, and I perfectly agree with him as to the necessity for that. He calculated that he would have something like 200,000 or 300,000 men; but how this force was to defend a long continuous line 100 miles long he did not say. It appears to me that if you do not have forts of some sort you are simply defending an enormous position. I rose merely to draw attention to this. I think that if the impression were to go out to the public that in the opinion of a large and important meeting like this London can be rendered safe by constructing a road 100 miles long, with magazines and caponiers at intervals, it would be a very great pity.

Major-General BAILLIE, late Bengal S.C.: I wish to say a few words. Some ten years ago I had the honour of reading a paper on the same question in this theatre, but for some reasons it was not published. I considered the defence of London a secondary object, the object of my paper being to point out that fortifications might be economically constructed, that the only way in which fortifications could be constructed round London was to make them *pay* in some way or other. My first point was to suggest, as our gallant lecturer has already laid down, a double line of road, but in my paper what I proposed to make was a double line of railway; earth-works to be thrown up out of the ditch in front, and that ditch would be available in many parts as a canal. The point was how that was to be made with the least expense. I think that can be very easily done by letting the railways themselves contribute to the line by constructing a line at right angles to their own line as they enter London at a certain fixed distance outside. All our railways require enormous tracts of ground for their empty carriages. The coal supply of London every day requires 10 miles of empty carriages to be stowed away somewhere and go out next morning. I do not say that we should compel the railways to make the line as a military work, though we have compelled them to do a great many things such as our great Saltash and Menai bridges and so on that were scarcely necessary; but in this case I think that every railway that came into London should construct say a mile or a mile and a half on each side perpendicular to it; the cost of connecting these lines together in a great circle about London would fall in a very small sum

upon the community. The forts themselves might also be utilized. We have recently been rearranging our gaols; many of these might have been placed with great advantage at a distance outside, and if you take the plans of our forts of Portsmouth, many of the large forts on the Gosport side, I do not think they could be better used than as gaols, or for many purposes, such as sites for hospitals for infectious diseases, and of some objectionable manufactories which it would be very desirable to get out of London. These forts might be built by the Government and their interior arranged for these purposes, and I think by the time they were really called into use as forts they would have repaid a very respectable rental.

Captain C. B. MAYNE, R.E.: May I be allowed to correct a false impression, Sir as to what I said? It seems to have been thought that I advocated conscription as a remedy for our defenceless state; I only said I should like to see it. The remedy I proposed was that our present field army should be thoroughly equipped with artillery and cavalry, and every means of moving and living, before any secondary matters were attended to.

Major ELSDALE: The only point which I think has been raised to which I ought to reply on this occasion is in Sir Gerald Graham's remarks. In reply to those I may say that so far from saying that London should not be fortified I shall in my next paper discuss how it shall be fortified, where it shall be fortified, and how we should best spend the millions I think we ought to spend upon fortifying it. The point of this paper has simply been this, not to say that we do not require fortifications, but that we do require a strong reserve position for our field army to occupy or fall back upon—a stronger reserve position than we have got at present. The way to strengthen that position is to provide guns and ammunition, and to get that special supply of guns and ammunition which I contend are necessary actually on to the spot. The whole question is,—will a General who is charged with the duty of defending our capital against such an attack be in an altogether stronger position than he is at present to meet the attack if you give him eighty powerful guns with 100 rounds per gun actually on the position which he has got to occupy, and which as Colonel Tovey most justly said is 100 miles long? But in order to enable him to make sure of getting those guns, or a great part of them, and that ammunition, and the machine-guns and their ammunition on to the right spot, I propose to spend 400,000*l.* in giving him special facilities for doing so in roads, railways, and telegraphic communication, and I shall show in my next paper when I come to consider the question of the turning movement of the enemy that it is contrary to all reason and to every sound military judgment that we could possibly be turned or out-flanked. The General in command of the troops who has to occupy that portion of that position which may be in the zone threatened by the enemy will have an overwhelming advantage in flank communications in moving and shifting his defence as compared with an invader. How, when, and where we shall provide such further means as may be necessary to supplement those I shall discuss in my next lecture.

Friday, May 14, 1886.

MAJOR-GENERAL SIR ANDREW CLARKE, G.C.M.G., C.B.,
C.I.E., R.E., in the Chair.

THE DEFENCE OF LONDON AND OF ENGLAND.

By Major H. ELSDALE, R.E.

PART II.—*The successive Stages of the Defence.*

IN the former portion of this paper I argued that the establishing of such an amount of protection for our capital as will secure it against a sudden attack by such forces as an enemy can hope to carry across the Channel at one time is a matter of the most pressing national importance.

I trespassed upon your patience so far as to go into this portion of the subject at considerable length, not only because it seems to me to be of the greatest importance in itself, but because such protection to our capital if judiciously carried out will afford an excellent basis and groundwork for such other more complete defensive measures as may hereafter be decided on.

But the question of the proper defence of London is inseparably bound up with, and cannot be properly treated apart from, the more general question of the defence of England against invasion. For any kind or degree of protection which we may give to our shores, or any obstacles we may put in the way of an advancing enemy between the coast and the capital, are clearly so much protection given to London.

It is now therefore desirable to enlarge our horizon considerably, and I propose here to review in much less detail the general course of a probable invasion of England having for its goal and ultimate object the capture of London, together with the preparations by land necessary for meeting such an invasion.

An analysis of the whole subject in the order in which I propose to deal with it is given for convenience in Table I below.

TABLE I,

Showing the Successive Stages of the Land Defence against Invasion.

Order of work to be done for the defence of London.	Approximate cost of items included in the defence of London itself.
<p><i>Stages 1 to 9. Defensive Preparations in Peace.</i></p> <p>Stage 1. Decide upon a continuous circle of defence round London, to be held at any point by our existing forces, supplemented by a strong movable reinforcement of powerful guns of position and machine-guns, supplied by good permanent magazines at moderate intervals, with assured communications everywhere. <i>We secure London thereby against a coup de main,</i> and force an invader to undertake larger and more extended operations for its capture, involving the continued command of the sea, and the occupation of a harbour on the coast as a base of operations.</p> <p>„ 2. Complete the fortifications of Chatham. Secure the passage of the Thames from Gravesend to Tilbury by permanent works on each side. Secure the coast-line northwards from the Medway as far as Harwich by land batteries, and by a local force of gun- and torpedo-boats.</p> <p>„ 3. Secure the great naval ports and dockyards.</p> <p>„ 4. Secure our most important commercial harbours being those most convenient to an enemy as bases of operation against London, or most important to protect our commercial marine and the food supply of our population.</p> <p>„ 5. Guard the coast-line in certain localities favourable for disembarkation, especially in those best calculated to prevent the enemy from landing, marching on a neighbouring harbour, turning its defences, and securing it as a base.</p> <p>„ 6. Provide by the construction of one or two entrenched camps in Ireland, and by the fortifications of the Isle of Anglesea and Holyhead, for the recall of most of the garrison of Ireland, while securing its possession and reoccupation at any time.</p>	
	<p>£ 900,000</p>

Order of work to be done for the defence of London.	Approximate cost of items included in the defence of London itself.
	£
Brought forward . . .	900,000
Stage 7. Construct a number of permanent works to strengthen the first line of defence round London at important points.	1,040,000
„ 8. Construct a set of reserved fighting positions nearer the capital, as an inner line for the defenders to rally upon and check the enemy, in case the first line is forced.	1,000,000
„ 9. Construct three permanent entrenched camps near London to strengthen the defence, and to provide rallying points and bases of operation for our troops against a victorious enemy.	1,050,000
<i>Stages 10 and 11. War Preparations.</i>	
„ 10. Construct a number of small hasty provisional works to strengthen the line of defence on the threatened front.	
„ 11. Construct a line of provisional redoubts on the threatened front.	
<i>Stages 12 to 18. The Seven Stages of the Struggle from and after an Enemy's Landing.</i>	
Stage 12. Oppose the landing, drive any of the enemy who may land into the sea, if possible, before they can establish themselves on shore.	
„ 13. If the enemy make good his footing on shore, check him, while securing the nearest harbours, or rendering them useless to him as bases when captured.	
„ 14. Recall the garrison of Ireland to assist in the defence.	
„ 15. If the enemy secure a base, shut him up in it.	
„ 16. If the enemy secure his power of debouching from the base, obstruct his march and gain time.	
„ 17. Fight on the prepared line of defence.	
„ 18. If the line of defence be forced, rally on the reserved fighting positions; hold on to the Thames and entrenched camps, organize street fighting on an immense scale, and defend London house by house.	

Order of work to be done for the defence of London.	Approximate cost of items included in the defence of London itself.
<p style="text-align: right;">Brought forward....</p> <p>Stage 19. If the enemy be everywhere victorious in the field, the ultimate defence of the capital, and the possibility of continuing the struggle if it be captured, will best be secured by the construction of entrenched camps at commanding points round it (see Stage 9 above), and by a central arsenal at a distance from it.</p>	<p style="text-align: right;">£ 3,990,000</p>
<p style="text-align: right;">Total £</p> <p style="text-align: right;">Say £</p>	<p style="text-align: right;">3,990,000</p> <p style="text-align: right;">4,000,000</p>

You will observe that the security of London against a *coup de main* as above constitutes Stage 1 of this table. It is followed by eight further measures or successive stages of defensive peace preparations. These are all, as I shall submit to your judgment, legitimate and reasonable. A strong and patriotic Government, with a clear view of the realities of our position at present and the enormous interests at stake, might most properly carry them out. But they are not all equally or all at once necessary.

The question of their comparative importance, and of what amount of money ought in reason to be spent upon them at present or at any future time, cannot be satisfactorily or properly dealt with without a still further widening of our horizon, so as to include at one view the requirements of our Navy and other leading defensive necessities of our Imperial position generally. For it is clear that as our Navy is stronger it has a better chance of defending our shores from invasion and so securing our capital, and *vice versa*. And it is clear that we must protect the food supply of our population, otherwise we shall be rapidly starved into submission, and all our defences rendered useless. So if we are to form any sound general conclusion on the subject, and appraise any item in our programme of land defences in Table I at its just relative value and importance, it seems absolutely necessary to include under our view these other Imperial requirements. I have therefore thought it necessary to submit here a further table, Table II. In this I have endeavoured to arrange such a general schedule of some of our leading defensive requirements, whether naval or military, and to show in it the proper place and approximate relative importance of these various successive items advocated in Table I.

Table II,

Showing the Items (as estimated) of Defensive Peace Preparation against Invasion given in Table I (*here printed in italics*), arranged in their Proper Place and supposed Order of Relative Importance in a more General Schedule of our Leading Naval and Military Requirements.

Order of
importance.

Primary Measures to Resist Invasion.

- | | | |
|----|---|--|
| I. | { | 1. Ironclad fleet to command the Channel.
2. Movable force of gun- and torpedo-boats to assail enemy's vessels and oppose a landing.
3. Protection of Royal dockyards or naval ports.
(a.) By forts and submarine mining.
(b.) By local gun- and torpedo-boats, and coast defence vessels.
4. <i>Defence of London against a coup de main.</i>
5. Defence of the mouths of the Thames and Medway, and coast as far north as Harwich. |
|----|---|--|

Primary Measures to Secure our Food Supply and Commerce.

- | | | |
|-----|---|--|
| II. | { | 6. Fleet of fast cruisers to sweep the seas.
7. Protection of our leading commercial harbours.
8. Protection of our leading foreign harbours and coaling stations. |
|-----|---|--|

Primary Measures necessary to Secure our Position and Interests at Home and Abroad.

- | | | |
|------|---|--|
| III. | { | 9. Mediterranean squadron.
10. Defence of coast-line where suited for a landing.
11. Entrenched camps in Ireland; fortification of the Isle of Anglesea and Holyhead.
12. <i>Forts to strengthen the line of defence round London.</i>
13. <i>Reserved fighting positions to strengthen the defence of London.</i> |
|------|---|--|

Secondary Measures necessary to Secure our Position and Interests at Home and Abroad.

- | | | |
|-----|---|---|
| IV. | { | 14. Royal Navy where not included above.
15. A fortified central arsenal.
16. <i>Entrenched camps round the capital to strengthen the defence against invasion.</i>
17. Protection of our remaining commercial harbours.
18. Protection of our remaining foreign harbours and coaling stations. |
|-----|---|---|

I hope that my object in submitting this second table will not

be misunderstood. I do not for one moment undertake to decide upon the exact comparative value and importance of these various and widely-removed requirements. I do not pretend to say, for instance, how much out of any given number of millions to be spent upon our Army and Navy should be allotted to the defence of our capital in any of its stages, or to some other of these our various requirements at home or abroad. My object in submitting this table is quite different. It is threefold.

I wish first to make it clear to you in a practical way that the views here put forward are moderate. I am not blindly advocating an enormous or extravagant outlay on the defence of London to the exclusion or neglect of our other requirements. Thus you will observe that the expenditure of a considerable sum is here advocated for the construction of powerful entrenched camps to strengthen a line of works for the defence of London, and to give the basis necessary for further resistance in case this line were forced by an enemy. But although such an expenditure is considered legitimate and proper, pray note that it is placed very low down in the list, after a whole host of other naval and military requirements which it is thought should be first attended to. Very probably some Officers will think I have underrated rather than overrated the importance of these entrenched camps.

Secondly, I wish to submit a definite basis for discussion in order that the opinion of the members of this Institution may be elicited, and if possible some substantial agreement arrived at upon these great questions, with which the safety of our capital and our country are so intimately bound up. Do we consider that London should be protected by special works or do we not? Or are we prepared to throw upon our Navy, or upon any coast defences, or upon both combined, the tremendous responsibility of its protection? If we should agree that it ought to have independent protection, then shall we rest satisfied with a strong defensible position on every side of it, or ought we at once or at any later stage of our general defensive preparations to fortify it regularly? Or how far shall we trust to provisional works to be thrown up in a hurry whenever the occasion may arise? If something like a general consensus of professional opinion on such fundamental points as these could be arrived at, it would I apprehend be a most excellent thing. The hands of responsible heads of departments should be greatly strengthened thereby in dealing with these questions.

Thirdly, I desire by these tables to make clear to you the position which I occupy, and am prepared here to support, in respect of two or three opposite or supposed opposite schools of opinion on the question of the defence of London. One set of Officers, whose opinion is entitled to great weight, say, and have long said, that in view of the supreme importance of our capital it ought by all means to be regularly and strongly fortified against any and every attack. Others at the opposite side of the controversial arena, to whom the great Austrian strategist, Baron von Scholl, has lent the weight of his great authority, take a different view. They say that the evil conse-

quences of allowing an invader to march through our small, densely-populated, and highly centralized country, especially in view of his possible occupation of our great manufacturing centres, would be so enormous, and that the defensive line afforded by the sea coast is so advantageous generally, that we cannot afford to limit our defences anywhere short of our coast-line. The proper defence of London in this view is on the high seas and at the coast, and not in any works at or near it.

A third set of Officers occupy to a certain extent an intermediate position between these two extremes. They would give up the idea of defending London by special works on account of its vast size, and the great supposed expense involved. At the same time, in view of the great length of our coast-line, and the many points at which an invader might land, they are not prepared to scatter our small army and dispose it at or near these numerous points to be in immediate readiness for opposing a landing. They would sacrifice to a certain extent this object of offering the strongest possible opposition to an enemy at or immediately upon his landing. While presenting then any available local opposition, they would reserve our main defence, and would gather up our forces to oppose him in the best available position between the coast and the capital, according to circumstances and the direction of his march. It is this last course to which we are more or less committed by the facts of the situation at present, and this is likely to remain the only course open to us in the absence of any special preparations and arrangements matured in peace for enabling us to adopt one of those previous alternative courses in war.

The position which it is here sought to maintain on this whole question will be made clear to you by these tables as we proceed.

Let us now glance through Table I and say a few words as required upon the various items or successive stages of the defence.

Stage 2.—*Complete the fortifications of Chatham, secure the passage of the Thames from Gravesend to Tilbury by permanent works on each side. Secure the coast-line northwards from the Medway as far as Harwich by land batteries and by a local force of gun- and torpedo-boats.*—The security of the mouths of the Thames and Medway is evidently an object of the first importance. Our coast-line northwards towards Harwich is so close to the capital, and so open to attack, especially at the mouths of the Blackwater and Crouch, by an enemy well supplied with boats or a flotilla of light-draught vessels, that it ought most clearly to be protected. The security of the passage of the Thames is, moreover, an object of the first strategic importance. For by a well-fortified *tête-de-pont* here, we put the garrison of Chatham and all the troops in the south-east of England in a most favourable position for operating on the flank of an enemy advancing anywhere from the side of Harwich or the north-east, and *vice versâ*, we enable the troops at Harwich or the north-east to be sent southwards to assist the defenders of Chatham and the south-east.

These objects hang all together and cannot well be separated. They are so intimately bound up with the security of London that they should apparently be considered as of primary importance, and

take precedence of everything else. Whatever else may or may not be done for the permanent defence of our capital, or for any of our numerous other requirements at home or abroad, I submit to your judgment that these two items (Items 1 and 2, Table I) should be forthwith attended to. Accordingly you will observe that I have placed Stages 1 and 2 together in the first rank of relative importance in Table II as urgently requiring attention at this moment.

3. *Secure the great Naval Ports and Dockyards.*—The moment we have, as above, arranged to give our capital some reasonable amount of immediate protection at a moderate expenditure, that moment we ought, as it seems to me, to give up all idea of any further present expenditure upon its more regular and complete defence.

Baron von Scholl's argument now comes in regarding the importance of our coast protection. So we ought apparently to turn our eyes seawards, and deal next with the security of our great naval ports and dockyards as the nurseries and bases of operation of that great right arm of our strength, the Royal Navy.

4. *Secure sixteen commercial harbours selected from those most convenient to an enemy as bases of attack against London, or most important to secure our commercial marine and the food supply of our population.*—Once let us have secured London against a sudden *coup de main*, and an enemy cannot well do us any harm in an invasion without first making himself master of, and establishing himself strongly in, a good harbour as a base of operations on our coast. For otherwise his communications with the invading army and the maintenance of its necessary supplies would be most precarious and uncertain. They would be liable to be severed, and his forces left isolated, by stress of weather alone apart from hostile movements of ours. No enemy could apparently afford to undertake an operation of this magnitude on such a precarious footing, although it may be well worth his while to do so at present, while our capital lies invitingly open. So the capture and secure maintenance of a good base on our coasts would be almost inevitable. Next, therefore, after the great naval ports with their dockyards, which, if captured, would afford invaluable bases to an enemy, we ought to secure all those points on our coast which afford him convenient and accessible marine bases, especially those most conveniently situated for his march on London. Thereby we shall place him in the position of being obliged either to undertake at the outset of his expedition the difficult and arduous operation of forcing our prepared defences, and capturing such a base in the teeth of our strenuous opposition, or of submitting to the great disadvantage of having to put up with an inconvenient and incommodious harbour at a great distance from his objective, whereby all his operations would be crippled, and an invaluable gain in time would be secured to the defence.

Intimately bound up with this question, and of no less importance, is the further one of guarding our great commercial harbours, upon which depend the security of our vast commercial marine, and the food supply of our population. It seems clear that these two questions cannot be separated, but should be dealt

with as part and parcel of one great problem, the security of our coasts.

Sir Charles Nugent has so recently favoured us in his important papers read in this Institution, with a list of these harbours, and with valuable information concerning them and the coast-line generally, that it is unnecessary here to do more than refer to his list.¹ These harbours are twenty-six in number, excluding Chatham and the great naval ports. I should propose to deal first with about sixteen of the most important. The land defences would consist of forts, open batteries, or submarine mines according to circumstances. These would co-operate with such local gun- and torpedo-boats or harbour defence vessels as may be available.

5. *Guard the coast-line in certain localities favourable for a disembarkation, especially in those best calculated to prevent the enemy from landing, marching on a neighbouring harbour, turning its defences and securing it as a base.*—Viewing the limited time at my command I cannot here afford to say much upon this item. It is evidently a most necessary part of our coast defences, calculated to supplement and complete the defences of our harbours. There is much now requiring to be done in giving security to these exposed portions of our coast-line by the opening up or improving of coast-roads where required, the establishing of telephonic and telegraphic communication along the accessible beaches, with good look-out and signal stations at intervals, the organizing of local corps of volunteers for defence, and the construction of batteries to be manned by them, as well as by well-considered arrangements for despatching mounted corps of regular cavalry, yeomanry, and horse artillery from central positions inland at the shortest notice to any given point. Those forces should co-operate with small gunboats of light draught stationed locally in central situations in squadrons of not less than six. These would carry one or two long-ranging guns each wherewith to interrupt the landing from a distance. They would be manned by sea fencibles or marine volunteers from the maritime coast population.

This whole question of the defence of our coast, including the harbours, is very important. There is ample room for a most valuable discussion of it; and it is a matter for great satisfaction that we are shortly to be favoured with a paper from an able naval Officer upon it.²

6. *Provide by the construction of one or two entrenched camps in Ireland, and by the fortification of the Isle of Anglesea and Holyhead, for the recall of most of the garrisons of Ireland while securing its possession and reoccupation at any time.*—In case of a supreme struggle for our national existence such as is here in question, it will be generally admitted that we cannot afford to leave a large garrison of regular troops in Ireland as at present. Every available man will be urgently required for the main contest, and all such minor issues as the security

¹ "Imperial Defence: Home Defences." By Col. Sir Charles H. Nugent, K.C.B., see *Journal*, vol. xxviii, p. 427, *et seq.*

² Rear-Admiral Arthur, C.B., "On the Defence of the Coasts and Harbours of England, Ireland, and Scotland, in case of War." See this No. of the *Journal*.

of Ireland must, if necessary, be sacrificed for a time. At the same time it would be a most serious step, and a most humiliating confession of weakness, to withdraw all our troops unconditionally, and leave Ireland to its fate without making any provision for its security or reoccupation. We ought, therefore, apparently to consider whether there is any intermediate course which while setting free the troops, or most of them, during the emergency in England, would yet provide such a necessary basis for the security and early reoccupation of Ireland as would enable us to tide over the crisis satisfactorily without incurring the reproach of abandoning it. I submit that such a course is to be found in the construction of a small but strong entrenched camp on the south-east side of Dublin, where there is very suitable commanding ground. This would secure the very important harbour at Kingstown on the east side, and command the city on the west.

The security of Holyhead has already been included among our commercial harbours generally. It is clear that it is specially important when viewed as the necessary communication with Ireland, and that the Isle of Anglesea also, of which it forms part, should be secured.

Supposing these objects—the construction of an entrenched camp near Dublin, with its works on the north-east side commanding the Kingstown Harbour, and the fortification of the Isle of Anglesea, including the bridges of Bangor and the harbour at Holyhead—to be properly attended to in peace, it is clear, I think, that we should occupy a most advantageous position. We could recall the garrisons of all the outlying stations in Ireland to England, leaving only a small nucleus of the regular troops for the defence of the entrenched camp. These could be supported by a moderate number of militia or volunteers, sent over from England if necessary for the purpose. Or the defence could be largely left to detachments from the Irish Constabulary, an excellent and well-disciplined body of men, who could easily be taught to work the heavy guns and all necessary duties at very short notice. Large numbers of special constables would at the same time be sworn in, from the more law-abiding and respectable classes of the population, to assist the police in the maintenance of order in every district throughout the country, as required.

If then from Fenian or Home Rule agitation, or from the want of any sufficient number of reliable persons as special constables in any district, order could not be maintained therein in the absence of the troops, anarchy must be allowed to prevail till the crisis is over.

An enemy would hardly think it worth while to invade Ireland. If he were to do so it would be the best possible thing for us, as all his troops so employed would be so many out of the reckoning for the most serious work of invading England. And with our fortified camp and secure harbour near Dublin, we should be in an excellent strategic position, the best position which the circumstances admit, for opposing him.

It is then a further question whether a similar plan should not be adopted at Queenstown for the security of that splendid harbour. A

moderate expenditure on works in aid of our present defences there ought probably to enable us to secure this harbour both by land and sea. We should thus have two fortified and strongly held points, one on the east and one on the south coast of Ireland. These would dominate the whole country, and secure its possession and reoccupation. They would, moreover, place us in an excellent position for meeting the attack of an enemy from any quarter, while leaving a minimum number of troops outside England.

Political discussions are out of place within these walls, and I do not here discuss our present or future political relations with Ireland. Nevertheless it will be clear to you that if these suggestions were adopted they would go far to secure our military position and interests there in any and every eventuality. For we should then hold two doors leading into Ireland, by aid of which we could enter upon or withdraw from its military occupation at any time, at our own discretion and convenience. *Those doors we should lock and hold the keys in our own hands with a firm grasp against all the world, and against every enemy, whether from within or from without.*

7. *Construct a number of permanent works to strengthen the first line of defence round London at important points.*—It has been said in my former paper that there is nothing in my proposals to interfere with the regular permanent fortification of our capital, but that they should rather be regarded as paving the way for and leading up to it. It will appear by the relative order of importance which is assigned to such permanent fortification in Table II, that once our capital has been made reasonably secure against a *coup de main*, I should argue that we ought to defer any further expenditure upon its more regular and permanent fortification until a number of our other Imperial requirements, which will then be more pressing, have been attended to. But without such permanent fortification the defence of our capital will no doubt remain partial, incomplete, and of a more or less makeshift character; and I hope that the majority of Officers who have considered the subject will agree that the fortifications of our capital are a matter of great importance, calling for and fully justifying a large, deliberate, and well-considered expenditure.

Starting from our proposed first line of defence, considered at length in my former paper, as a basis, and assuming that work to have been carried out as an immediate and urgent matter, I would now ask you to consider the various steps of our proposed permanent fortifications. These works are divided into three successive and distinct stages, following all through the same guiding principle of doing the work piecemeal by successive additions on one single uniform and consistent design.

I propose in the first instance to confine ourselves to strengthening our first line of defence locally by the construction of good, powerful, permanent works of moderate size, armed with heavy guns, at important points along the perimeter.

Such points, the configuration of the ground marks out for us most clearly and unmistakably as regards the southern half of the position. They are the gaps or gorges in the line of heights along which our

line of defence passes. Through these gorges run the railways and the more important roads leading on the capital. By occupying the heights, forming the shoulders of these gorges with strong, permanent works, we shall gain a great tactical advantage by effectually securing the weakest and most accessible points of our extended position. We shall effectually drive the enemy off the line of the main roads and railways. This will most seriously cripple and retard his movements. Or we shall bring him to a standstill till he has taken the forts. If he elect to leave the forts unattacked and untaken, and succeed in forcing our line by a direct attack on the heights elsewhere, the forts will still render most excellent service. The enemy will be placed at a most serious disadvantage, and all his operations will be obstructed and lengthened by his having to carry on his communications off the main line of railways and roads, as well as to leave strong works threatening his rear. These he must mask by large detachments of his troops, and they will form most favourable bases and starting points for counter-attacks on our side directed against his line of supply and retreat. On the north side we shall similarly bar the leading lines of approach on our capital by occupying favourable commanding positions. One or two strong works should also be devoted to protect the water supply of the metropolis.

I propose thus to fortify our line, in sixteen places in all, by one or more suitable works in each case. These will be of greater or lesser size and strength according to the ground and circumstances. Taking the average cost of the works in each locality at 65,000*l.*, the total cost will be about 1,040,000*l.*

These isolated works would of course be powerfully supported in action by strong batteries of our field artillery and guns of position, thrown up for the purpose as part of the general defence of the adjoining line.

8. *Construct a set of reserve fighting positions nearer to the capital as an inner line for the defenders to rally upon and check the enemy in case the first line of defences is forced.*—I shall assume that it would be very unsatisfactory to trust entirely to a single defensive line so far from London, and having such an extensive perimeter, even if this line were to be defended by a large number of permanent works throughout its length. Still more is this the case when, as above, we are only proposing to fortify regularly the more important and vulnerable points of this great circle of defence. At the same time, it does not seem desirable to advocate the construction of a complete second line of defence throughout, on account of the great value of the ground in the suburbs of London, and great consequent expense of its construction. Following leading authorities on this subject, I would here propose the construction of reserved fighting positions, or strong defensible lines, covering the approaches to the capital. It is unnecessary for the present purpose that we should discuss the precise construction and locality of these lines. They would be arranged in suitable sections and dominant positions as regards the ground, so as to form natural and direct rallying points for the defenders when driven from the outer line or advanced position.

They would be at a considerable distance from the latter and much nearer the capital, which they would cover for practical purposes, so that the enemy would be bound to attack them.

As they would be formidable lines armed with heavy guns, he would be obliged to feel his way carefully, and to bring up a powerful force of artillery well supplied with ammunition for the attack. He must thus abandon all idea of occupying the capital by a bold forward march following immediately upon his victory, and much time would be gained to the defence. This would be invaluable for the execution of the stringent measures which the urgency of the situation would now demand, namely, the removal of non-combatants from that portion of the vast city lying in front of the enemy, and the preparation of barricades and street fighting. I shall argue later on that the true reserved defence and ultimate strength of London in any such supreme emergency lies in obstinate and well organized street fighting on a colossal scale, and not in any works whether small or great. I would merely ask you to note here that I regard this second line of works or reserved fighting positions mainly as a certain and reliable means of gaining the time necessary for the proper organization and preparation of this street fighting. With this view, I should not propose to make them as elaborate and costly as many Officers would think necessary. But the ground would be very expensive, so I allow 1,000,000*l.* for their construction.

9. *Construct three permanent entrenched camps to strengthen the defence, and to provide rallying points and bases of operations for our troops against a victorious enemy.*—This is the final stage of the defensive works, and constitutes as it seems to me the limit of the expenditure which it would be reasonable and proper to ask for in connection with this all-important subject of the defence of our capital. In order to exhibit and enforce the great value of these entrenched camps, let us revert for a moment to first principles. Let us take the broadest and most general view of the whole situation and ask ourselves this question: What are the primary and ruling conditions of the defence of London; wherein lies essentially its strength and its weakness? I answer without the smallest hesitation that the strength of London lies in its vastness, in the fact that it is divided into two portions capable of independent defence by a strong obstacle, the Thames—in the colossal scale of the forces and operations required for investing it properly, so as to cut off its supplies and starve it into submission. The weakness of London also follows from its huge size. Thereby the perimeter of the works required for its defence is so great that they tend to be strong nowhere, but to be open to a determined and concentrated attack almost anywhere. Now how can we at the stage at which we have now arrived best deal with these conditions, so as to utilize and improve to the uttermost our strength, and at the same time to reinforce and remedy as far as possible our weakness? The answer lies, as I submit to your judgment, in the construction of a few powerful entrenched camps at commanding and important points outside London. These will form strongly-held points within half a day's march of the capital. They will be so far

off that the ground required can be purchased and cleared at a moderate price, which is very important for economy, and yet so near that the position of an enemy penetrating between them and the capital, with a view to invest it without first capturing them, will be very critical and dangerous. By gathering up the defence at intervals into salient, commanding, and well-defended camps, capable of securely holding large garrisons, of strength unknown to the enemy, they will place him in the position of being obliged either to attack them at a great cost in time and means, or by refusing the attack to incur a most serious military disadvantage, and a great risk of failure in his attack on the reserved fighting positions behind them. They will present invaluable centres or bases of operations for large bodies of raw or only partly-trained troops, who can there be securely armed, equipped, drilled into efficiency, and held in immediate readiness for action when required in the midst of the turmoil and confusion inevitable in such a great struggle. As they would be well supplied with magazines and stores of all kinds, they would further render most efficient and valuable aid in that decentralization of the supply of stores and munitions of war, which has here already been insisted upon as most necessary. Finally, they would in the event of a disaster, or a series of disasters, form strong rallying points, which would enable the struggle to be continued with a good prospect of ultimate success, under conditions such as in their absence would render further resistance almost or altogether hopeless. Three of these camps at an average cost of 350,000*l.* apiece are here allowed for. I should place one of them near Dorking, one in a commanding position on the north-east of London, probably near Epping, and the third in a similar position on the north-west side, probably near Watford. But the exact locality is a matter for detailed consideration and enquiry, and I am not careful about it.

War Preparations.

10. *Construct a line of small hasty provisional works to strengthen the line of defence on the threatened front.*

11. *Construct a line of provisional redoubts to secure the threatened front.*—Provisional works will come in most opportunely to defend and close the long intervals which the supposed execution of the works in Stage 6 of our peace preparations above may have left in our defensive line. We should then be in the 'position of having the most important and vulnerable points on that line everywhere guarded by good permanent works, and could devote our energies in a crisis to strengthening the intervals on the threatened quarter with provisional works.

STAGES 12 TO 18 (TABLE I).—THE SEVEN STAGES OF THE STRUGGLE FROM AND AFTER AN ENEMY'S LANDING.

Stage 12.—*Oppose the landing. Drive any of the enemy who may land into the sea, if possible, before they can establish themselves on shore.*—

It would be foreign to the purpose of this paper to discuss the best means of preventing an enemy's landing on our shore, which is a large subject requiring separate consideration. It is extremely important, for besides our numerous and unprotected or imperfectly protected harbours, I have the high authority of Sir C. Nugent for saying that there are 88 miles in all of beach accessible and practicable for a landing on that portion of our south coast alone included between Margate and Selsea Bill. The question of how far we can afford to scatter and disperse our regular troops, or any portion of them, in those localities near the coast best calculated to enable them to be quickly on the spot to oppose a landing, and how far we must not rather gather them up and concentrate them in more central localities inland, is an extremely important one. I will only here say that it seems pretty clear that unless the enemy make an attempt on one of our fortified harbours, such as Portsmouth, where there are regular garrisons to oppose him, any resistance by land we may be able to offer in the first instance must be mainly confined to the efforts of local corps of volunteers, sea fencibles, and a proportion of the local militia, assisted by small flying columns of regular or yeomanry cavalry and horse artillery, sent down when summoned by telegraph from central stations, a short distance inland in each district. The peace preparations required to strengthen such a defence we have already dealt with.

13. *If the enemy make good his footing on shore check him, while securing the nearest harbours or rendering them useless to him as bases when captured.*—So long as any of our important harbours suitable to serve as bases for an enemy in an invasion of England are left unprotected, or so insufficiently protected that their capture by a bold and determined attack may be reasonably calculated upon—so long will the enemy be tempted to make them the immediate object of his attempt in the first instance. But measures are now most happily in progress for securing our most valuable and vulnerable harbours. In proportion to the extent and completeness with which these may be carried out will be the increased probability that an enemy will then decline the direct attack or make it only a collateral part of his operations, and will trust mainly to turning and capturing these defences by a sudden landing on some accessible point of the coast anywhere in the neighbourhood of the harbour in question, and a forced march upon them. In such a case as this our exertions on the defence must be mainly directed to two points. Every effort should be made to check the enemy in his march, to delay all his operations, and give time for organizing and strengthening the defence. And at the same time the most decided measures must be taken to render the harbour useless if captured. If a number of colliers, merchant steamers, or any available vessels are placed in positions such that they can be scuttled and sunk at the shortest notice at the entrance of the harbour, the Officer in command will then know that if the day goes against him, or if he is not strong enough to make a good defence, the place when it falls into the enemy's hands will be of little value until the channel has been cleared after a great loss of time.

14. *Recall the garrison of Ireland to assist in the defence.*—When an enemy has succeeded in landing in force and establishing himself on the soil of England, it is high time to recall the bulk of the garrison of Ireland. I have already pointed out the means whereby this can apparently be best effected without abandoning or giving up the command of Ireland.

15. *If the enemy secure a base, shut him up in it.*—Let us suppose an enemy to make himself master of one of our harbours, whether by direct or indirect attack as above, and to land in only moderate force in the first instance. This may very probably be the case, especially if he make two or three landings, or pretended landings, simultaneously at different points on the coast, with a view to distract and mislead the defence. His intention is then to strengthen and establish himself in the occupied harbour, and to turn it into a protected base for his subsequent operations, when he will land the main bulk of his forces at the base thus secured. Our primary and most obvious course is then to assemble all the troops from all quarters immediately available, and by a determined attack drive him into the sea if possible. But he will be prepared for this, and will not lose a moment once he has captured the harbour in fortifying himself against such an attack. The question as to whether we have a better chance of thus overpowering him by a vigorous attack with superior forces, or of shutting him up in the place which he has occupied, will depend upon the ground, time, and circumstances. But in most cases, the latter will be our best chance. For no enemy is likely thus to land on our shores with less than one strong Army Corps complete, including a powerful force of artillery. It will take two or three days or more, according to the locality and circumstances of the moment, before we can bring up a force calculated to attack them with any good prospect of success. Meanwhile, if the local conditions are not very unfavourable, they will have established themselves very strongly in a defensive position. A failure in an attack on it would go far to demoralize our men and encourage the enemy at the outset of the campaign, and is by all means to be avoided. It will generally pay us much better to bring down every man and every gun available, to drive in the enemy's outposts and confine him within the narrowest possible limits inside his defensive line, and to fortify ourselves strongly on our side in the best available defensive position commanding his debouches from his base. Our position should have a good communication by road and rail for our own supplies, and a sufficient water supply. We ought then rapidly to improve it with all the resources of Great Britain in men and means, till it is transformed into a large and powerful entrenched camp, manned by a great army. This course throws upon the enemy all through the onus of attacking us in our own prepared and strong position, where our less trained or untrained troops will have no occasion to manœuvre in the open against his more practised battalions. We also gain this great advantage, that we confront the enemy firmly at the outset of his invasion, and bring all his operations to a standstill until he has attacked us at a great disadvantage on prepared ground of our own choosing.

With our enormous command of railways we ought to be able to bring down men, guns, materials, and appliances for the defence of our position faster than he can bring over men, guns, materials, and appliances from the Continent to attack it. And I would bring down every man and every gun to be found in all Great Britain, if necessary, to maintain our superiority. Then let the enemy strengthen himself in his base as much as he pleases. Let him bring over half a million of men if he likes. He can effect nothing. We command his debouches from his base. Whenever we can recover the command of the Channel he must withdraw from it precipitately or surrender at discretion.

16. *If the enemy secure his power of debouching from his base, obstruct his march and gain time.*—Careful preparations should be made in advance, and rehearsed frequently in peace manœuvres, for checking the enemy's march on London from any point where he may have effected a landing or established himself on the coast. He should be compelled to move in as closely concentrated a mass as possible, instead of occupying a large front and covering many parallel roads. He should be prevented from supplying his troops with provisions or forage *en route*, or from gaining information as to our movements and position by sending out reconnoitring parties. He should be perpetually met and harassed in front, flank, and rear, by day and by night, to impede his march and exhaust his troops with continual duty. Railways and roads should be obstructed and blocked, rolling stock, wagons, and carts removed or destroyed, telegraph wires cut or carried off, bridges blown up, canal embankments cut to flood the country. Above all, careful and stringent measures should be taken for enforcing the proper execution of orders which will have been issued through the local magistrates and police, as to the driving away of horses, cattle, and sheep, and destruction or removal of grain and forage, in order that the enemy may not be enabled to horse his artillery and wagons, or to feed his troops at our expense.

All these objects can be best obtained by the equipment of a strong force of mounted infantry, and mounted engineers, or pioneers, to assist and supplement the action of our existing regular cavalry and horse artillery, as well as of the yeomanry cavalry, who are a valuable force and ought to be encouraged.

It is a most fortunate circumstance that the enemy is certain to be weak in cavalry. For the sea transport of great numbers of horses is such a difficulty, and so many will be required for the large number of guns and wagons which will be a necessity for the expedition, that he cannot afford to bring a strong force of cavalry as well. If the value and importance of mounted corps of volunteer riflemen were properly recognized, and suitable special encouragement given by the Government to them, there would probably be little difficulty in raising a considerable body of them. But I here submit that any deficiency in their numbers could be and should be supplied in time of war by arranging for the transport of specially selected battalions in wheeled vehicles hired for the occasion.

12,000 volunteer infantry and engineers specially mobilized might be divided with advantage into, say, six brigades, placed under the

command of selected and capable Officers. The yeomanry cavalry available might be divided between the brigades, so that each would have a proportion of them to serve as scouts, reconnoiters, and advanced guard. These flying brigades, each about 2,500 strong more or less, would then act either singly or in combination according to order against the enemy's front, flanks, or rear, and against his communications. Their leading duty would be to second and support the action of our advanced division of regular cavalry and horse artillery, as well as of any mounted infantry of the regulars who may at any future time be provided, in watching and checking the enemy's advance. To these they would render such efficient support that the united action of the whole force would be invaluable. The enemy's small force of cavalry would be driven out of the field and everywhere forced back on his infantry for support. He could not raise an ounce of provisions from, or gain any information by cross-examining the inhabitants of a town lying only a few miles to the right or left of his main line of march without sending a whole Division for the purpose. Any ordinary detachment would be forthwith surrounded and shot down or taken prisoners. If he leaves detachments of moderate strength to guard his line of communications, they too will be overpowered and cut off. And if to meet this he detaches strong bodies, these will most seriously weaken his main force for the approaching struggle. The advanced division of cavalry and horse artillery will be so strengthened by the co-operation of some of these flying brigades of infantry at any required moment, that instead of being obliged to retire before the advance of the enemy's infantry skirmishers, it will be capable of offering everywhere a stubborn resistance. This will enable them in turn to lend the most material aid and assistance to the more serious operations of the advanced Corps d'Armée, consisting of our regular troops of all arms, to whom will have been allotted the onerous task of meeting and checking the enemy's advance, so as to gain time for the works in progress nearer London, and for the organization and arming of the great masses of men whom we shall then be raising.

Before leaving this subject of checking the enemy's march, we might here deal with the very important question of an attempted turning movement on the enemy's part, with a view to attack our defensive lines at an unprepared or less prepared part.

It will appear, I think, on consideration that there is very little room for apprehension on this score if we give ourselves credit for only the most ordinary and moderate amount of foresight and activity. For, in the first place, the portion of our general defensive position which will have been put more especially into a state of defence immediately on an enemy's landing in force will not be a small or confined one. It will probably be not less than 30 or 40 miles in lateral extent, comprising that whole section or zone of our position which lies directly open to his attack. On this section of the defence will be concentrated the men, guns, ammunition, and stores of all kinds necessary for the approaching struggle, while large gangs of civil workmen will be everywhere opening up communications, throwing

up provisional works, and making preliminary preparations for its defence. These preparations will be everywhere pushed to a point at which a very strong defence is actually ready or could be completed at short notice, leaving as much as possible the demolition of houses and destruction of valuable property until it is seen to be really necessary. As the enemy advances, his objective point will be defined within lessening limits every day. The defence can be drawn in and concentrated to meet him accordingly, and increasing numbers of workmen will be taken off from the sides where it is seen his attack will not fall, to push on the works at those positions where it may fall. As the enemy nears our defensive lines, he will thus have immediately in front of him a position in a complete state of defence, flanked on each side by sections so far forward that they too could be rapidly completed if required to a similar condition, with good free lateral communications and facility of movement for men, guns, and stores everywhere.

Now any kind of turning movement on the enemy's part must be either a strategical or tactical movement. If the former, *i.e.*, a flank movement undertaken while he is yet at a distance of one or more days' marches from our line, we have every possible facility for conforming to his movements and establishing an equally good defence in the new position. For we have only a few miles to move our defence, *with all the conditions necessary for a rapid movement carefully prepared beforehand, always supposing that we wake up to the necessity of such preparation now in time of peace*, whereas the enemy has a far longer distance to traverse over roads and ground carefully prepared with every kind of obstacle, both active and passive, to delay him. Moreover, the ground in England is generally close and difficult, and provides abundant facilities for delaying his march. We are bound, therefore, to be well beforehand with him, without giving ourselves credit for anything more than an extremely moderate amount of military resource and activity.

But if the enemy is to undertake a tactical turning movement when within striking distance, he will commit himself to one of the most difficult and hazardous operations in war, merely to arrive, if he be successful, at a point of our position only a short stage, if at all, behind the rest in preparation and readiness to receive him.

On the south or most important side, such a turning operation will be above all impracticable, as there the position which we have selected gives us an unrivalled vantage ground of observation, from which the whole country southwards towards the enemy can be clearly seen for many miles, so that we could not fail to discern and defeat such an attempt in any ordinary weather, apart from any question of advanced guards, outposts, and reconnoitring.

17. *Fight on the prepared line of defence.*—I refer to my first paper for a discussion of the general conditions of the defence, which we have no time here to go into further.

18. *If the line of defence be forced, rally on the reserved fighting positions, hold on to the Thames and entrenched camps, organize street fighting on an immense scale, and defend London house by house.*—It

has already been said that the reserved fighting positions, if constructed, are to be regarded mainly as a certain means of arresting the enemy's victorious progress after the outer line has been forced, and gaining time thereby for the organization of street fighting. The real and ultimate defence of London, in my view, lies in its vastness, and in the almost unlimited capabilities it presents for street fighting on a gigantic scale, coupled with the extreme difficulty of surrounding or investing it, and the fact of its being divided into two independently defensible halves by a formidable and very defensible obstacle, viz., the Thames.

I ask you to consider this question. If a mere handful, comparatively speaking, of Communists, the scum of Paris and of Europe, made such a formidable defence of Paris that they were only overcome by a very large army of regular troops after severe fighting extending over several days, what number of invaders will be required to take London, supposing the vast city to be defended house by house by the whole power of England, directed by our ablest Officers, and supported by all the resources of the country poured in by rail on the uninvested side?

Let the enemy make good his landing on our shores, which is always possible, and which no reasonable development of our naval strength can apparently be relied upon effectually and under all circumstances to prevent, considering the many unknown and uncertain elements in modern naval warfare. Let him march on our capital and beat us everywhere in the field, a contingency which, considering the immense comparative superiority of Continental armies over our small and composite forces, it would be folly not to reckon with. Let him force any prepared line of defence round the capital of which at present we have none. Let London lie open before him. If the spirit of Englishmen be then in the future what it has been in the past, the hardest task of all will then still await him, and the real struggle will be only just commencing.

The enemy will be everywhere confronted by high and strong barricades of stones and earth, defended by artillery and machine-guns, and flanked on each side by loopholed houses all down the streets, giving a deadly cross-fire. He cannot storm these barricades. If he attempt it, his loss of life will be enormous. He cannot storm them nor can his field-guns level them. He must mine and sap through the houses on each side to turn them, and where he can mine and sap we also can mine and sap. Every yard of his path will be attended by the explosion of our defensive mines. No doubt he can riddle and destroy houses by the score with his artillery, but this will not take the barricades. And we shall also have guns on our side and of larger calibre than his. When, after infinite labour and great loss, he has secured a line of barricades closing the streets immediately in front of him, it will be only to find another line of still stronger and better prepared barricades a little further on, and so on to any extent. His men will fall by the hundred and by the thousand in such a struggle. If he advance boldly, determined to get on, his loss of life will be enormous, and will soon

bring him to a standstill. And if, to avoid this, he feel his way cautiously step by step, looking everywhere for mines and searching every house for riflemen as he goes, the work will be so interminable and laborious, that the best troops on the Continent would soon be utterly sickened and worn out by it. For to capture a vast city like London in such a way would be an affair not of days but of weeks, with men falling by the thousand every day. Any reasonable number of invaders would find themselves buried and lost in a vast mass of ruins representing the ground already won, with a still vaster mass of barricaded streets and loopholed houses everywhere in front of them representing ground yet to be won. It is a very doubtful question, I think, whether any number of men which a Continental invader could undertake to bring over could take London defended in such a spirit, and apart from any aid from special defences of any kind, provided always that we hold on strongly by land and water to the line of the Thames as we are bound to do, and provided we make such a continual stubborn fight everywhere and all around as will force the enemy to move in concentrated masses, and thereby prevent him from investing the city and compelling it to surrender by starvation.¹ We might succeed in this, but it is certainly a very open question whether we can expect to do so without the aid of entrenched camps, and a second arsenal at a distance from Woolwich, the need of which we will next consider. In any case, if we are to succeed in such a struggle, we must be prepared probably for very sweeping and stringent measures at an earlier stage for diminishing the food supply required, by sending a part of the population of London, especially those on the threatened quarter, away to other parts of the country by road or rail.

Above all, we must gain time for organizing the work. For such a defence to be successful against the trained and disciplined armies of the Continent must be systematic, and well organized on an immense scale. The vast circle of defence must be divided and subdivided into zones and sections under able and determined Officers, who must have unlimited authority to remove non-combatants, blow up or demolish buildings, barricade streets, cut off or lay on gas and water supply, and carry out every necessary measure under the direction of a Commander-in-Chief, who would be practically a dictator for the time. All this cannot be arranged in the actual presence of the enemy, and we must take such measures in advance as will enable us to gain a few days or a week before he can appear.

The misery and ruin inflicted on an unoffending civil population by such a defence of London would of course be enormous. Very possibly the country would not have the courage to endure it, though

¹ We cannot of course afford to allow London to be invested. Once it is invested its doom is sealed. It must forthwith surrender. But my argument is that, although we may not be strong enough to meet and beat the enemy in a pitched battle and in the open, we may yet, by holding on strongly to the line of the Thames and to the entrenched camps, succeed in confining him within one zone or sector only of the vast circle required for investment. We must also protect the water supply of the capital, and to that one or two of the permanent forts, if not one of the entrenched camps, should be devoted.

I am inclined to think that we could and should do it if we could only gain the necessary time. In any case the suffering and risk of failure involved would be sufficient to take away all possible excuse for presuming upon such a defence in advance, and thereupon neglecting our present preparations. We ought by all possible means, and beyond all question, to take such measures now in peace as will enable us to avoid the necessity of such extreme courses, and if we do not do so, whatever may happen, we deserve to fail.

19. *If the enemy be everywhere victorious in the field, the ultimate defence of London, and the possibility of continuing the struggle if it be captured, will best be secured by the construction of entrenched camps at commanding points round it (see Stage 9, above), and by a central arsenal at a distance from it.*—Having already dwelt upon the importance of these entrenched camps as part of a thorough and complete system of national defence, I cannot here afford to say much more about them. They will immensely improve the defence of London by very largely increasing the difficulty of investment, and forming strong centres and rallying points of defence at wide intervals apart. An enormous number of men, probably a million, would be required to invest the capital, and with such a force against us the final result would still be doubtful and uncertain. I am here assuming, of course, that much time will be occupied by such large and extended operations as would then be necessary on the enemy's part, and that meanwhile we shall be raising men by hundreds of thousands to oppose him.

If, then, we had besides the entrenched camps a large fortified central arsenal to keep up the manufacture of munitions of war and replace Woolwich, which would probably be one of the earliest points attacked by the enemy, we should have a very good chance of final success, whatever number of men might be brought against us. The food supply of our population will then be our leading difficulty, but the measures now in progress for protecting our leading commercial harbours will go a long way to meet this.

Concluding Remarks.

Table I contains such a complete analysis of these papers that it is not necessary for me to take up your time any further by a recapitulation or summary of what has been said.

I would, however, make a few observations on some of the leading conditions, which will go far to determine our success or failure in the defence. These are—

(a.) *The time available for organizing defence subsequent to an enemy's landing.*

Time to organize our defence and bring up our men is of such importance to us that I have already urged that the defence of that portion of our coast-line comprised between the mouth of the Thames and the Medway on the south and Harwich on the north—sufficient to prevent an enemy from effecting a landing in force upon it—is a primary necessity of our position at present. For if an enemy be allowed to land in force, say, at the mouth of the Blackwater, he may in two days seize a commanding position on the high ground between Epping

and Romford, from which he can overlook the capital and be in London itself the third day before we can muster our troops in sufficient force to stop him, or organize the stubborn and systematic street fighting which has been advocated above. When this portion of our coast-line has been efficiently protected and we have in addition a fortified *tête-de-pont* to secure the passage of the Thames at Tilbury, so as to threaten an enemy's flank in any such operation, we shall be in a far better position. Meanwhile it seems likely that the necessity of such protection will on the outbreak of a serious war be so evident that no Government who may then be in power can afford to neglect it, at least so long as the capital itself remains unprotected and defenceless. I shall assume, therefore, that at such a crisis detachments of our naval and military forces strong enough to secure this portion of our coast-line will have to be tied down to guard the estuary of the Thames and adjoining coast towards Harwich. From a general or imperial point of view this is very objectionable, but as things are at present it seems inevitable.

But if this portion of our coast be guarded one way or other so that a descent upon it becomes too risky and uncertain for an enemy to undertake, he will be driven to land either on the south-east coast below Margate or else north of Harwich, and most probably at some point of our exposed southern coast. In this case he ought not probably to come actually in front of our defensive line protecting London under a fortnight. But this again depends entirely upon the efficient organization, extent, and success of our measures for checking and delaying him. This is why I have devoted so much space in this paper to a consideration of the best means of so doing.

(b.) A leading point to which I would here invite your special attention and would propose as a fit and most important subject for discussion is this: that in my view *all our arrangements for the defence of England under present conditions as regards our military strength should be based upon and should lead up to the defence of London on a line forming a continuous circle round it. This should be laid down by authority once for all, and every year something should be done, whether by the execution of necessary works and defensive preparations, or by rehearsals and practice on the part of the troops who are to man it, to strengthen, perfect, and complete its defence.*

I ask you to consider carefully this most serious question: Can we afford with our present small forces consisting of a composite array of troops, in all stages of efficiency and training, to stake the fortunes of the Empire on the defence of any position intermediate between the coast and a strong and carefully prepared reserve position for the defence of London, seeing that we might be turned, outflanked, or outmanœuvred out of such an intermediate and isolated position, and in any case it could not be nearly so strong as one forming a section of a continuous circle of defence round London, and carefully considered and prepared at leisure beforehand for the purpose?

The programme which I have had in view all through, and which I submit to your judgment as the only sound one, is this: that we should fight to forbid an enemy from landing, or to prevent him

from acquiring a base, or to shut him up in and prevent his debouching from his base if he does capture one. After this we should confine our efforts to delaying his march, to checking and circumscribing all his operations as much as possible; and we should reserve all serious fighting till we can fight on our leisurely prepared and thoroughly well understood position surrounding London.

(c.) Let me now say a few words upon a very important and fundamental question, namely, the necessity of regular works of any kind to defend London. "If," it may be said, "your defensive position surrounding London will be so strong as you say it will, then why spend a far larger sum in addition in permanent fortifications; is it that after all you have no faith in your proposed defence?" Not so: I believe that such a defensible position as I have advocated will, when manned by our available forces of all kinds, give us a secure defence; and if not, it should be strengthened on the same lines till it is strong enough. But though it may then be amply strong enough, it does not therefore follow that the fortifications are unnecessary; far from it. For it would then still remain vicious in principle from a general strategical point of view, and viewing the defence of the country and Empire as a whole, that such a large proportion of our total fighting strength should be required for the defence of our capital alone. We should still require the regular works to economize men, to render our capital defensible by a moderate garrison assisted by a moderate field army only, and to set free the large number of men not then included in the necessary garrison of the capital to meet the many other pressing demands which are sure to arise in various quarters at home and abroad. It is a mistake permanently to tie down the bulk of our whole fighting strength to the defence of our capital, though at this moment and for some time to come it is inevitable. Our capital should be rendered independently defensible by a moderate force aided by suitable permanent works, so that the bulk of our forces may be sent elsewhere as required.

As regards the cost of my proposals, I have confined myself to a rough estimate of the items included under the defence of London proper, which has been all along more immediately in view.

It will be seen in Table I that the cost of the items included under Stages 1, 7, 8, and 9 amounts to about 4,000,000*l.* If to this we add 500,000*l.* for the items comprised under Stage 2, which are so directly connected with the defence of London that they might well be included in it, we obtain a total of 4,500,000*l.*

This sum should secure our capital for generations to come against any attack.

But I hope it will have been clear to you that of this sum only a moderate fraction, namely, 900,000*l.*, is proposed to be expended all at once.

The items representing the remainder of the money should rather be dealt with after other necessary services, such as those detailed in Table II, have been fairly attended to.

If any member of this Institution considers that a strong and patriotic Government, with a due sense of the immense importance of

the subject to England and to our whole vast Empire, might most justly and reasonably ask the House of Commons to vote the whole 4,500,000*l.*, and make a good job once and for all of the defence of our capital, I shall not be in the least likely to quarrel with him. But for the sake of economy, and in order that my proposals may not be considered extravagant, I have here been much more modest, and advocated only the immediate expenditure of a far smaller sum.

In conclusion, I once more desire to commend this subject, namely, "the necessity for defending London," to your consideration, hoping that whatever view may be taken of the merit of any of the proposals which have been submitted to your consideration, this at least may be generally agreed on, that our capital, the great centre, focus, and heart of our vast Empire, a magnificent prize to tempt and entice any enemy who, in the absence of our fleet or on obtaining the temporary command of the Channel, can make a sudden swoop upon it, ought not to be left any longer defenceless.

Mr. TRELAWNEY SAUNDERS : I am afraid you will feel that this is a case of "fools stepping in where angels fear to tread," but I confess that my audacity has been stimulated by the very opening of the first portion of this paper, in which Major Elsdale speaks of "the apparent indifference of the British public to the most important and vital questions connected with the defence of the Empire, and the languid and fitful interest displayed in them by the Government," as the motives which have induced him to take up this question. Now, Sir, that is scarcely just to the British public, for you can hardly look at the existence of our Volunteer Force and then say that the British public are indifferent to the defence of the Empire, and it has surprised me in the course of these lectures, that in speaking of the Government, so little has been said of what the Government has done as a very first step to the discussion of such a question as this, in the general survey of the country upon a most useful and practical scale. The 1-inch map which was begun at the commencement of the century is now undergoing complete revision, and yet the 1-inch map itself is really the basis upon which our engineers have been content to lay out the preliminary arrangements of great railways and other public works, and it is certainly a work not indicating any negligence of the Government with reference to that branch of the subject. But since that time we have had maps on scales of 6 inches, 12 inches, and 5 feet to the mile, completely laying bare every road and footpath in the country, and answering questions such as those which have been started by the lecturer, especially as to the communication for the defence of London. But, Sir, I think the public at large will scarcely be enamoured with a proposal that would commit them to such enormous works of defence, works of defence that must at all events be mainly theoretical, and that may not be called into action, for that must depend upon the course that the enemy may take. And moreover, I consider, for my own part, that at the present moment when the mind of the country is being directed towards the more close connection of the Colonies with the mother country, the union of the whole of the Monarchy under one general system of administration, it is unfortunate to let it be supposed that the centre of Government is more anxious about itself, about the defence of London, than it is about the Monarchy in general. And even if the defence of London be everything to us, and I am not going to minimize the importance of that defence in the slightest degree, but if the defence of London be of such great importance, still, Sir, I think it is not of such great importance that we should overlook the defence of the more exposed parts of these British Islands, I mean especially our coast towns, which possess considerable populations, considerable wealth, and are in themselves of considerable importance even to the metropolis itself, and therefore I would say that the first point to which our

attention should be especially directed is to the defence of our coasts. And when I recollect what took place in the last great attempt—I put aside the Boulogne affair under the first Napoleon—the last great attempt to effect a landing on these shores, the attempt of the Spanish Armada, I should like to see the course that was taken on that occasion repeated on any future one. What took place then? We did not wait for the enemy to land, we collected every vessel whatever its size might be, every vessel that could carry a man and a weapon, and we rushed out into the Channel to meet our enemy on the sea, and that is where the battle for the defence of London ought to be fought, and for the defence of our shores in general. And that appears to me to have its foundation laid in the fact that at the present moment every yard of our shores is under patrol night and day by our coast-guard, and if you would only work upon that basis, and constitute a system of what might be called Marine Volunteers, using our coast-guard stations so far as necessary as depôts for the training of these Volunteers, and encouraging our gentry to provide whatever vessels or platforms for working weapons of offence may be desirable, leaving the selection as widely open as possible, until experience has shown us in what direction some general system should be introduced, I say that in that direction we should offer to an enemy a more terrible opposition than any that could be afforded by a land force. How should we meet an enemy, Sir, in such a case? Recollect what he would be composed of. He would be composed largely of land forces, and the poor creatures would be half dead with sea sickness to begin with. I contend we should be meeting them under the best possible circumstances. Just as our forefathers, Drake and Hawkins, and the rest of them with their little vessels attacked the big galleons, the equivalents of the ironclads of the present day, without considering whether they were bigger or smaller, so I say with the force we could bring to bear upon any force that could be imagined as venturing into the Channel to attack our shores, there could be no question as to what the result would be if such weapons as are now at our command were only brought to bear upon such an occasion. And moreover, Sir, recollect that such a method of defending a coast-line is as available for any maritime Colony as it is for ours. And I do say, considering the great aim we have of uniting the Monarchy under one common administration, and considering also that the limit of nationality is the capacity for a common defence, that unless you can show that the defence that you would apply to the British Islands is a defence that can also be applied to our Colonies, you hardly make out that common defence which ought to be the common bond for the whole Monarchy. I am afraid I must not take up your time much longer. I have touched upon what I consider to be the main points that I wish to offer to you. I should like to say one or two words more, for instance, Sir, I think in such a question as coast defence, a very important use might be made of a corps that stands second to none in its services to the Crown, and that is the Marine Corps. And, sir, I would say that such an employment should be made of the Marine Corps as to add to the value of the regular forces. For instance, I would add to the Marines an Engineer Corps, and I would place the whole of our maritime fortresses under the Marines, and would liberate entirely the regular forces from garrison duty. I would no longer consider the regular forces as a defensive force at all, and would treat them entirely as an offensive force, and I would connect them also with a permanent transport service, that should enable us to place 30,000, 40,000, 50,000, on any part of the Continent or any part of the world where they might be most wanted for our purposes. That would be a use of our regular forces trained and disciplined to the very highest extent; and that would be a use of our small army that would make it more powerful than the largest army that the Continent could produce because of its mobility, because of our capacity, which no Continental army would possess, of moving it by means of the sea to any point where it was required.

Admiral Hon. E. R. FREMANTLE: I am very much disappointed that we have not here amongst us military men who will speak to the elaborate details which have been brought before us to-day by Major Elsdale. It will probably be caused by their having spoken on the previous occasion, and I may at once say that I do not feel myself at all competent to touch on many of those questions which have been certainly very elaborately threshed out by my friend Major Elsdale. I feel

sure that every person here present would wish this to be a not merely academical discussion, and that we should not go away merely passing compliments, as I see was stated the other day, but that we should say exactly what we mean. If we are to produce any impression on the public this must be a real discussion, and persons who take part in it should say really exactly what they mean. Therefore, I shall perhaps be excused if I say exactly what I mean, and I should begin with these tables, and I should ask to read down to the first comma. "Decide upon a continuous circle of defence around London, to be held at any point by our existing forces," and there I should stop. Although I speak as a naval Officer, and have a very high appreciation of the Service to which I belong, I think at all events I am speaking from a national point of view, and from no mere narrow professional feeling, when I say that the defence of this great Empire must be left mainly and principally to the Navy. That I think is admitted generally enough by the lecturer. The lecturer mentions Baron von Scholl, the Austrian strategist, and says the proper defence of London, in his view, is on the high seas or at the coast, and not in works near London. To elaborate a little further what my views are I should say distinctly we do require defence at the coast or near the coast. I should certainly say if any enemy did have the temerity to land our object should be to drive him into the sea, and we should also endeavour to box him up if he should hold any harbour or strategical position. Further than that I do not think I should be inclined to go, except that I do think the Government should, and I have no doubt the Government has, and I do hope that all Departments of our Government, and I hope our gallant Chairman will be able to tell us that the Government have considered the question as to what defence we should make in what I must consider the extremely improbable contingency of an enemy landing in force on our shores, so that we should be able to make some resistance to him. It is scarcely worth while for me to point out how extremely centralized everything is in this country, how we are dependent so entirely upon our over-sea stores. It has been pointed out over and over again that we possess but a very small food supply in this country. Right or wrong, in recent years the progress of our policy has been to make us more and more dependent upon over-sea supply for our daily bread. Under these circumstances I do think that if any hostile Powers were to have for a certain period, even for a short period, the command of the seas, not only would our Mediterranean garrisons be necessarily overpowered, not only should we probably lose India, but we should be simply starved out at home; and under those circumstances I do not think it very germane to the question of the defence of this great Empire to treat it as a possibility that we should be able to maintain a siege of London. But, as the lecturer has said, the capture of London by an enemy means that that enemy has got us by the throat and can force his own terms upon us. The lecturer asks whether "any well-informed naval Officer thinks the Navy has ever been in this generation, or is likely to be in the immediate future, strong enough to protect our vast commerce all over the world, to ensure the safety of our food supply, to meet and beat any possible enemy's ships on the high seas." I cannot answer that latter question. I do hope that we are strong enough to do so. This I am quite certain of, we shall do our best to protect that large commerce, and if we are incapable of protecting our commerce and the food supply of this country I am afraid we shall have to submit to whatever terms a foreign Empire may impose upon us. But if I digress for one moment from what I have stated, namely, that I do not feel very competent to touch on a regularly military question, it is because it sounds to me very much like a challenge when the lecturer says that any enemy taking London would have grasped England by the throat. Now if one only thinks for a moment of the configuration of these islands one would see it would be quite possible to adopt all that the lecturer has proposed, and still that England would be very decidedly grasped by her throat. The way would be naturally by the seizure of Hull and the occupying of all our great centres of production, of the great manufacturing cities, such as Manchester, Leeds, Liverpool, and Hull, and with these in the hands of the enemy unquestionably we should be grasped by the throat. It seems to me the country would be cut in two, and under those circumstances we should have to submit to almost as bad terms or quite similar terms as if London itself were seized. Therefore, I do think we should

direct our attention more to the subsidiary parts of the lecturer's programme, those that touch upon the proper organization of our troops and upon what may probably be done, rather than go into the question of spending money in the directions which have been principally pointed to, I am afraid, by the lecturer. I am quite aware the lecturer in coming here to give us his views has given us some very valuable and very important views. I am quite aware that he has shown a great deal of energy and ability, and that with regard to many of the details which I have ventured to say we should leave out—I only venture to say I should leave them out because they cost money—as I am aware that they are very valuable, and will be very valuable to anybody who undertakes to say what should be done in the case of the possible invasion of this country or the prevention of its invasion. Therefore, I should say distinctly I should not protect London by special works. "Are we prepared to throw upon our Navy, or upon any coast defences, or upon both combined, the tremendous responsibility of the protection of London?" I should say distinctly upon both combined, and I should say further that I should naturally differ from the lecturer when he says, "whatever be the struggle in the north of England we should have secured our capital, and that would be an enormous gain." Now I consider that that gain would not be an enormous gain, nor would it be, I may say, much worth consideration. Before I sit down I should like to summarize what I have stated. I do hold to a great extent with the poet that "our home is on the ocean wave," and that we do not need too many bulwarks. It must be apparent to every one of us that all nations when they begin to go down think more of their defences than they do of their offences; they think more of those things that can be produced by money than they do of what can be produced by bone and sinew. I would only refer on this point to such cases as the great wall in China or the wall against the Picts and Scots which the Romans erected in this country. I hope what I have said is not painful to the lecturer; I have a very high opinion of him. I have had the pleasure of his acquaintance, and I hope to retain it. However, holding these views as I do very strongly, I have ventured to bring them to public notice in order to make people understand clearly that we do not come here for academical discussions, but that we say candidly what we think with reference to the questions brought before us.

Major H. H. CROOKENDEN, R.A.: It is quite possible to imagine that a combination of European or foreign Powers could, with the aid of their fleets, overpower ours for a time, that our own vessels would be driven into the dockyards which are, or ought to be, at the present time properly protected by fortifications, and that during a short time, say from two to three weeks at the outside, these vessels would be repairing and refitting, and during that short interval this combination of European forces, or even one force possibly having command of the Channel, should disembark a force upon our shores. The very want of food in England that has already been touched upon would, in my opinion, force the enemy to bring all his food with him, and his inability to make requisitions upon the country as is usual on the Continent would, I take it, limit the campaign to seven days, that is, allowing two days for disembarkation, and five days for his march towards London accompanied with fighting. If any more lengthy operations were undertaken I imagine that our vessels would then have been able to repair and refit in the dockyard, and would assail the ships bringing his supplies, and hence the enemy's absolute necessity for a speedy conclusion of the campaign. I cannot imagine that any satisfactory result should ensue from any fighting on the coast. Assuming that the enemy has landed I cannot conceive that there would be anything but waste of men and material in attempting to harass him there, though no doubt our advanced cavalry could by desultory fighting retard him enormously, notwithstanding the large number of roads which would be at his disposal. If he has once command of the Channel he will disembark when he pleases and where he pleases, and, in my opinion, without opposition. His own vessels would keep off the gunboats that the lecturer has referred to to-day which are supposed to be armed with long-range guns, I mean the gunboats of light draught, so that they could hardly co-operate in preventing or harassing his landing. Upon this ground I take it the security of London against a *coup de main* virtually settles the whole question. If the military road suggested is once constructed so as to surround the

capital and the defensible stores of ammunition and arms made, the rest would follow of itself. The most vulnerable point round London is undoubtedly on the Essex side, and this is the side that has the least natural strength, and the one to which the greatest attention should be paid. Lastly, I would point out that there is at the present moment no mobilization scheme whatever. There is an old one which was published in 1881, but this virtually is a cypher. The 2nd and 3rd Army Corps are largely composed of militia battalions belonging to Ireland, and these have not been called out for training for several years.

Major FEATHERSTONHAUGH, R.E.: I should like to say one or two words respecting a *coup de main*. The point to my mind is from what direction is the *coup de main* to come? It will not come from the north-west, the west, or the south-west, that would not be a *coup de main*, for it would be going a long way round; it must come from the north-east or south-east. Against an attack from either of these two directions I believe the position of Chatham is a perfectly strong enough defence. If you have at Chatham as many men as you can possibly get together they can either cross to the north at Tilbury to take in flank any advance from the north-east, or if they stay at Chatham they will be on the flank of any force advancing from the south-east. That being the case, in a country like England where it is so inclosed, and there are so many facilities for throwing up works, I believe that our Army could always place itself across an invader's path and at one day's notice make as good an entrenched camp as in a fortnight or more. Look for instance at Plevna, that position was taken up in a hurry, but it kept off the enemy for weeks. The defence of Petersburg was a similar case. I saw the defences of Petersburg, and they were very slight. In the place where most of the fighting was the troops were about 300 yards apart, and the rifle firing went on day and night in order to prevent a surprise. In the other parts where the works were certainly better no serious attempt was made to attack them. That siege lasted seven months, and Petersburg was never taken in the real sense. Therefore I consider the English Army under the above circumstances would hold the enemy until his attempt was no longer a *coup de main*, but a serious siege of London; and that being the case we come to the second part of the paper, the defence of London against something more than a *coup de main*. I should be afraid the measures Major Elsdale recommends would, in the mind of the public, produce the impression that London was defended when it was not defended. Although I am an Engineer Officer, and although "there is nothing like leather," I think it may be said that there can be no doubt that fortifications will keep out troops. The Metz forts were never besieged, they were only invested; the siege of Paris was the same thing. Therefore if you have fortifications of the right kind I believe London would never be taken except by investment, in which case we must assume that the English fleet is destroyed or driven off, and the country is held on all sides. That being the case, then permanent fortifications would be of great use, as they would preserve London while the army went about to try and protect the rest of the country the best way it could. The point I wish to take is that these mitigated measures which Major Elsdale has recommended might be a danger; they would make people think London was defended in the right way, whereas it was not defended, and, in short, I think that as against a *coup de main* they are not required, and as against anything more serious they are not sufficient.

Lt.-Col. ROGERS: I have not had the pleasure of hearing the lecturer, but I have read the lecture. It is a curious coincidence that fourteen years ago a book was published in London called "England rendered Impregnable," in which a very similar system for the defence of London was advocated as that laid down by Major Elsdale, namely, field works erected here and there within a radius of 30 miles, and defended chiefly by machine-guns. In his lecture Major Elsdale has made no mention of the fact that the enemy who advances on London will unquestionably be in possession of machine-guns. In this country I believe the Gardner machine-gun has been adopted, but the enemy may be in possession of a far more efficient weapon, in my opinion, the Gatling, and for this reason, that the improved Gatling is capable of high-angle fire which will certainly shell out the men manning the T-shaped entrenchments where the Gardners or the Nordenfelts would be. This is the one point that I wish to bring before the meeting, for

unquestionably machine-guns would be invaluable for the defence of such a large district as the surrounding neighbourhood of London, and also they would be useful in the event of the army being withdrawn from Ireland, because there is no mistake but that they would do the work for the army so withdrawn.

General COLLINSON, late R.E., who was present at the first meeting, but was obliged to leave, and was unable to be present at the second, sent the following notes, which, by permission of the Chairman, were read by Major Elsdale.

THE DEFENCE OF LONDON.

I should wish first to express my satisfaction that Major Elsdale has undertaken this paper; as from his essay on "the Causes that have led to the Pre-eminence of Nations in War" (on which occasion I was one of the judges), I formed a high opinion of his comprehensive views, and of his power of dealing with the details of a subject. The part that I heard of the present paper confirmed me in this opinion. My observations will be on certain prominent points of the subject.

1. *The Value of London.*—On this head I beg to draw attention to an important paper by Sir E. Du Cane, R.E., in the "Fortnightly Review" for April. He quotes the high authority of Mr. Giffen for the statement that the value of all the property and money in London must be about *one thousand million pounds*. If this is at all near the mark, the ransom that would be exacted by a conqueror for sparing it would, in money alone, be such amount that probably the mere interest of it for one year would be far more than the sum calculated by Major Elsdale for putting London in a state of security by permanent works.

2. *The Character of his General Propositions.*—He proposes to begin with such slight works as he can get money for, trusting to be able to make them fully efficient when money is available. I think we ought to state clearly our opinion as to what is necessary for the absolute security of London, and leave it to the executive advisers of the Government to determine how and when they are to be carried out. I think we should not put forth any ideas with the authority of this Institution (for a certain authority attaches to papers read and discussed here) that will lead the people of this country to imagine that the kingdom can be secured from invasion without great undertakings, fully considered, taking years to mature and requiring a great deal of money and men.

Two Lines of Invasion.—Major Elsdale is right, I think, in this distinction. An enemy or combination of enemies might make their preparations openly in time of peace and ostensibly for other objects, and when all was ready the declaration of war and the invading armada would leave together. In this case we should not have more than a fortnight to prepare. Now, there are two certain difficulties, whatever our preparations, that we must always expect to find. 1st. The enormous pressure on the Government departments for matters not fully provided for. 2nd. The delay of the Government in moving at all. Hence it is important that even for resisting a *coup de main* nothing should be left to be done at the time which can possibly be done beforehand. Or the enemy may wait till a period in the war comes when we may be weakened and distracted by distant undertakings, and then make the attempt with fuller means. Our defences must prepare for both these cases, and that should be clearly laid down at the beginning. And as in the latter case the period of threatened invasion may go on for months, that difficulty will have to be taken into consideration in allotting the Volunteers. It cannot and ought not to be expected of Volunteers that they will remain away from their business for twelve months continuously.

The Volunteers.—I agree that they are the only force we have to look to to defend London. But it will take every Volunteer present and possible to do it if reliefs are to be provided for, and the line of defence is to be more than 100 miles long. And then over and above the garrison of London there are the garrisons of our great fortresses, and of the forts at the principal harbours and round the coast; and beyond that the field army, and beyond that the force to line the south-east coast along that 150 miles of dangerous proximity to the capital. For all these various requirements, and all of them must be manned to some extent, we ought to be able on declaration of war to put at least a *million* of men under arms

for the defence of the kingdom only. We cannot call on the Volunteers to provide this number; it would be unfair and unsatisfactory.

The Line of Defence of London.—I do not see any objection to the length of the proposed line of defence; indeed, I agree with Major Elsdale, that it ought thoroughly to include the Thames and Medway. The port of London is fast extending to Gravesend, and would offer a large booty to an invader in the docks and warehouses of the lower reaches, and we should keep up the connection between London and the sea. There should be no difficulty in a densely populated and exceptionally rich country like ours in providing both the men and the money to carry out all the above-mentioned branches of the defence of the kingdom. Not to do so would be encouraging possible enemies to think that we considered the defence to be something beyond our powers. In such a long circuit of defence it may be desirable to form completely entrenched camps at certain favourable positions round the inclosure.

Character of the Works.—It is on this head that I differ from the lecturer. He is inclined to trust to what we must call field works manned by Volunteers for resistance to a *coup de main*, and apparently he is willing to leave a considerable portion of these works to be executed after the declaration of war. For reasons before mentioned I strongly deprecate leaving the complete execution of any work to be done during that short period of intense excitement. I wish those inclined to such confidence would read the angry correspondence that went on for months in 1803-5 between the various departments of war as to the relative responsibility of each, and the failure of supplies that resulted thereon. But as to the character of the works, I don't think there is any authority in military history for the successful defence of field works on ordinary ground by irregular troops against a regular army. There are good instances of such defence by one regular army against another, and by irregulars against irregulars. I am ready to allow that breech-loading rifles have put a new kind of weapon into the hands of our population particularly calculated to increase their powers of defence, and that machine-guns add greatly to that power in flanking positions. But the men to work these guns must be not only intelligent and zealous as Volunteers are, but trained to firing in war and disciplined to hold together. If such training and discipline is to be got out of Volunteers, there is no need for us to have any regular troops at all. The security of the capital of the Empire must not be trusted merely to zeal and intelligence, however great. If Volunteers are to hold London against any attack by regulars, they must feel more secure behind their field works than any guns or entanglements can make them; there must be good permanent obstacles to give them the necessary confidence, and no obstacle equal to a well-covered wall has as yet been invented for this purpose. I think, therefore, that this valuable paper of Major Elsdale's would produce a much more beneficial effect on the people of this country, and produce a far greater permanent good towards the defence of London, if the pith of it was put somewhat in the form of the following propositions:—

1st Proposition.—That certain powers in respect of buildings and user over a zone of ground round London be obtained by the Government.

2nd Proposition.—That the works necessary for an efficient permanent defence be planned and be commenced and continued from year to year.

3rd Proposition.—That the Volunteers be employed by regiments or battalions, some every year upon the entrenchments, and other accessories which would be required on declaration of war to complete a continuous line of defence.

Major ELSDALE, in reply, said: The only points that I need take up your time in noticing are one or two referred to by Admiral Fremantle, the first being the very important question of food supply. If Admiral Fremantle will look to Table II, he will observe that after dealing with the most important and pressing necessities of the country, I then refer to the primary measures to secure our food supply and commerce—a fleet of fast cruisers to sweep the seas,—protection of our leading commercial harbours, and protection of our leading foreign harbours and coaling stations. I put those matters well in front of "Ports to strengthen the line of defence," "Reserved fighting positions to strengthen the defence of London," and "Entrenched camps." That is to say, I entirely agree with him that the food supply question comes first, and it is of the most vital importance.

Next as regards an enemy landing at Hull, or anywhere up in the north, ravaging the country and taking all the great manufacturing towns, in my first paper I dwelt upon the probability of such a course being taken, and thereupon argued that as much as possible of the defence of London should consist of movable elements, and I accordingly provided for 180 powerful guns of position, and 300 machine-guns to be moved down as required to Hull, or any port where an enemy might make his landing, in order to put us in the best position that the circumstances would admit of for meeting such a contingency. I submit to Admiral Fremantle's consideration that if my views were adopted we should be in this position, that we should have secured the great centre and heart of the Empire against an attack by an enemy, and in securing it we should so dispose our defensive measures that they could, if required, be taken to any part of the kingdom to meet such a turning movement on the enemy's flank, and that, I say, is, on the whole, the best situation that the circumstances admit of. As regards what Major Featherstonhaugh said, if I understood him rightly, he seemed to say that the position of Chatham, taking an enemy's defence in flank from any quarter, was a special protection to London. I venture to say I cannot agree with him at all. The enemy would simply be in this position, that he would be obliged to detach such a number of his men as would be sufficient to hold in check the garrison of Chatham. He would then march straight on London. We should be in the position of dividing our forces into two, if I follow the argument rightly, one part being locked up in Chatham, because the enemy would never dream of turning aside to attack Chatham, and would merely detach such a movable column as might be necessary to check the advance of the garrison of Chatham against him, and would push on at once with his main force to take our capital. Once he were in London, if you had fifty Chathams they would not be of the slightest value to you.

Major FEATHERSTONHAUGH: What I said was, Chatham was a position that the whole British Army could use and pass through from south or north, not merely the garrison, but the whole British Army.

Major ELSDALE: There I entirely agree, because I also dwelt on the importance of Chatham from that same point of view. I rejoice to find that there is nothing of importance between us. I believe these are the only points of importance that have been raised.

The CHAIRMAN: I am sure the Institution will not ask me at this late hour to detain it with very many remarks upon this most important and interesting subject, to which, no doubt, the paper that has been read by Major Elsdale is a most valuable contribution. As to the general scope of the paper, and the remarks that have been made upon it, I honestly confess my own individual sympathies are rather with the remarks that fell from Mr. Trelawney Saunders and from Admiral Fremantle, than with those contained in the paper, or made by Officers who have supported the paper. I have in this theatre, and also in the responsible position I hold in laying any measures before the Government, laid down this one leading principle with reference to the defence of England, namely, that the defence of England and of her Empire depends upon our position being such that at any moment we can take the offensive. The very moment that you abandon that and seek to regard only the defence, refraining from a wise expenditure upon your offensive power, that is, upon the power of your fleet and your transport service, and all your mobile troops, you are entering, in my opinion, on a dangerous course with reference to the future of the Empire. I therefore hail with extreme satisfaction the expressions of opinion that have fallen from a civilian—Mr. Trelawney Saunders—who does us the honour to speak to-night, as showing that apparently in his mind, and I hope in the mind of the British public, the great hope of securing the integrity of the British Empire, the defence of England, and preventing even the foot of a foreigner reaching our shores or approaching to this great city, lies in the knowledge that England can, and will, when necessary, strike whenever she wishes and wherever she desires. With these remarks on the general question, it will not be desirable, perhaps, to go into any review of the subsequent discussion on the paper itself, but, assuming for a moment that it was desirable that we should advocate the measures which have been proposed by the author of the

paper, I may state that I am afraid, from my not small experience in works of this kind, that his estimates are below the mark. I am very much inclined to agree with Major Featherstonhaugh, that unless we entered upon a defence of this kind with a full determination upon our part to make it whole and complete, we should be again entering upon a rather dangerous course. The position of the city of London renders the subject of the defence of London by the engineer's art a question the like of which the world has never yet seen. There is no other city in the world like London, with its five or six millions of people living in houses unique in their character, for our system is that the house itself contains only one family. The result is that this city has spread out in all directions, and is still spreading, and therefore we do not know where the zone of defence that we might decide upon to-day would be twenty-five or thirty years hence. The result of this growth of London would be, that the protection which would be sufficient for to-day would be utterly useless in years to come, and the vast expenditure that would be incurred would be thrown away. Nay, more, the very fact of insisting that there should be this zone of defence to a certain extent cripples the very industry and enterprise of the country; because, in order to make the works of defence which have been proposed by the author of the paper of any value, you must reserve rights over large areas, or they would be worse than useless. The requirements of a defensive work are not limited to the site upon which it stands, especially now-a-days with these new arms ranging over far greater distances, distances increasing every day, so that the moment you come to deal with these questions in a really practical form you are led to a solution of the problem which is sure to be rejected the moment you have to deal with it in a concrete shape. I therefore still go back to the point with which I commenced, that the exceptional circumstances of this great city and its enormous population confirm the principle that the traditional policy of the country must be adhered to, and that even supposing the first line of defence, that is to say our fleet, were forced, the defence of London must be secured by its armed citizens taking the initiative outside of London itself. That is the true defence of London, and let every man who has property and has the interests of the country at heart know that, if an enemy has landed on our shores, it is not behind walls that he is to defend hearth and home, but in the open country between London and the sea. That is to my mind the only practical solution of this question, and I believe in my heart it is the safest. I think it my duty, as Chairman, not to pass by without notice a remark which fell from a distinguished Officer, whose opinion upon a matter of this kind carries great weight. From the position which I have held in the public service under various Ministers of the day, whether of one party or the other, I do not think, and I am quite certain those who have had experience of the matter will agree with me, that the Ministers of the day have been wholly neglectful of this question, nor do I think that the administration either of naval or military matters is in any way to be improved by the suggestion which Sir Charles Nugent threw out the other day. In a Constitution like ours there are an enormous number of anomalies. The administration of the Navy by a Board, and the administration of the Army by a single individual, appears at first sight to show that there is an organic difference between them. Practically there is none. The Chief Minister of the Army is really responsible just in the same way as the First Lord of the Admiralty, and although we call the professional Officers who assist the First Lord of the Admiralty by the name of a Board, there is very much the same thing at the War Office, where the Secretary of State for War is surrounded by his own staff of professional Officers, who can, and do, advise him just in the same way as the Admiralty Board advises the First Lord, so that there really is no practical difference between one system and the other. The responsibility rests with the chief. It has also been said that the organization and administration of the Army and Navy in this country is not what it ought to be. No doubt to those who wish to have a theoretically perfect system there are certain inconsistencies in the matter; but, whilst I perfectly agree that we should have everything as far as possible thought out and fairly organized at the very commencement, I should be very sorry to see eliminated from the English character and the English system any particle of that thorough self-reliance of individuals which, after all, is the outcome of what appears to many people, and especially to

our friends on the Continent, rather a system without a principle. Remember that in the case of some of our neighbours who theorize to a very great extent, and who have their systems apparently in a very perfect state, if one little cog in the whole of their gear gets out of order their whole system is liable to break down. It is exactly the reverse with us. From the system upon which our Officers have been trained, our machine never is absolutely put out of order, and we always find, even if the system goes wrong, that the self-reliance of the English character immediately puts things to rights again. I should therefore deprecate having too much of the delicately organized system, which after all is the bottom of this paper, too much engrafted upon us, because, as Admiral Fremantle really did indicate, when we come to measures of that kind we are thinking more of ourselves than of other higher interests that we have in view. I beg your pardon for making this digression. While I have to a certain extent expressed my feelings not quite in sympathy with this paper, I do not the less appreciate the ability and talent of my young brother Officer in having prepared this paper, and I very cordially ask you to give him your thanks. There are many valuable thoughts in it, and with your permission I will convey to him the thanks of this meeting.

Friday, May 21, 1886.

ADMIRAL THE RT. HON. SIR A. COOPER KEY, G.C.B., F.R.S., &c.,
Vice-President, in the Chair.

THE DEFENCE OF THE COASTS OF ENGLAND, IRELAND,
AND SCOTLAND IN THE EVENT OF WAR.

By Rear-Admiral W. ARTHUR, C.B.¹

IN order that two small islands, with a population of less than forty millions, should possess Colonies and dependencies in all parts of the world, and make laws for the government of one-fifth of the population of the globe, it is necessary they should command special advantages over other nations beyond brute courage, and I believe that the inviolability of our country for so many centuries from foreign invasion and the control of the sea during war-time, which we have always maintained, are the leading causes of England's greatness, and should these causes cease to exist, we shall cease to be the banking and trading centre of the world, after which our accumulated riches will gradually dwindle away. These statements appear so self-evident, that it may be considered unnecessary to assert them, but incredible as it may appear, they are totally ignored.

That the defence of our coasts is intimately connected with the state of our Navy none can deny, as our land defences are not of themselves in a condition to repel invasion, for beyond the permanent fortifications intended for the protection of our dockyards and the military positions at Portland and Dover, some of which are not completed, we have no first class sea coast defences, and, neglecting the consideration of the inefficient forts at the entrances to our first class mercantile ports, our numerous harbours are open to an enemy's fleet, and there is nothing to prevent a hostile army landing on our shores, supposing they held the command of the Channel, and the invading fleet were supported by ironclads. If under such circumstances London were endangered, we could not purchase immunity for having neglected to take timely precautions for the defence of our capital under four hundred millions of money; two hundred millions and the cession of Alsace and Lorraine being the price France had to pay to free their land from the invaders.

Now the question whether our Navy is still as capable of defending our shores as it has hitherto been, you will, I think, agree with me in answering in the negative, for the enormous increase in the

¹ Read in Admiral Arthur's absence from illness by Rear-Admiral the Hon. Edmund R. Fremantle, C.B.

mercantile marine of late years, and our entire reliance thereon for food supplies, necessitates the protection by the Navy of extensive ocean routes, whilst from the increased expense of building those men-of-war we now possess, our Fleet is much reduced in numbers, besides so many nations now purchase or build powerful ironclads, that the forces liable to be arrayed against us have increased; likewise the motive power being now exclusively steam, coaling stations in all parts of the world are necessary, and as few of those now in existence are fortified, the Fleet must also defend them.

In 1882 a Royal Commission investigated the question of coast defence, but the necessary outlay was enormous, and the Report has virtually been ignored.

In the same manner an estimate was made for permanently defending our coaling stations sufficiently to relieve the Navy of a portion of that duty; it amounted, I believe, to upwards of eighty millions, not a large sum compared to the amount required to buy out the Irish landlords, but large compared with the amount the country is willing to give; in proof of this look at the eleven millions Lord Palmerston had so much trouble to obtain in order to build the Spithead and Portsmouth Hill Forts.

We will now consider what steps were deemed necessary for coast defence, at a time when we were at war, and when an attempt to invade our shores appeared imminent.

In 1798 an Order in Council was passed authorizing the formation of a force for that purpose, to be called "Sea Fencibles." It consisted in 1804 of some 24,000 men, 12,000 in Great Britain, and 12,000 in Ireland; the former force was under an Admiral, with 92 Captains in charge of divisions and subdivisions, and the latter under another Admiral, with 32 Captains; there were also from three to six Lieutenants in each district.

They appear to have been chiefly employed in manning the boats of the armed flotilla stationed around the coast. The pay of the men was one shilling a day when called out for drill or muster, and when on active service they received the pay of able seamen.

At that time there were 131 vessels in commission in the English and Irish Channels, and 153 in the Downs and North Sea, in addition to the harbour flotillas. Yet in the presence of this enormous force our coasts were again and again insulted, our booms at the entrance to the harbours were destroyed, and our shipping captured or burnt, so that everyone must agree with what the "Naval Chronicle" of 1810 says,—“Our merchantmen captured before our eyes, with the enemy's flag floating with gasconading insolence, is too much for an Englishman's reflection.”

The question now presents itself whether the introduction of steam has lessened or increased the danger, and whether long-range guns are more favourable to the invader than to the invaded. The answer to this must be conditional. Steam is especially favourable to desultory warfare, carried on by small vessels possessing great speed. A few hours only are necessary for a hostile ship to make a descent upon a mercantile port, commit a depredation, or levy a ransom, and then

retreat in safety if her speed be superior to that of the enemy's vessels; she would incur but little danger so long as her engines and boilers are in good condition. Her one long gun would enable her to bombard and strike a town with every discharge, whilst on the other hand the chance of hitting a moving vessel two miles off is small.

We will now consider the effect of steam on an organized invasion by a fleet of merchant steamers carrying troops, field batteries, horses, provisions, munitions of war, &c., and supported by an ironclad fleet. An invasion of this magnitude could not be undertaken with less than 75,000 troops, and would require 500¹ first class merchant ships as troopers to convey them and their impedimenta; we should therefore know beforehand of such an expedition being prepared, and should they give us the slip, it would take them a week to disembark, during which time, if we had not lost our naval preponderancy in the Channel, we could, by means of steam, collect our fleet and attack them. It is useless considering a case in which we were outnumbered by hostile ironclads in the Channel, for should such ever happen, there would be nothing for it but a land fight for existence within our own borders; so I think we may assume that steam is favourable to desultory attack, but opposed to organized invasions, except under circumstances in which naval opposition could not be attempted.

But the most important new element in coast defence and naval warfare has not as yet been referred to, that is, the submarine mine and the locomotive torpedo. In these, combined with the torpedo-boat, whether submarine, submerged, harbour, or sea-going type, all of which have their uses, we have a defensive power which, if organized and developed, will enable us to establish a system of coast defence that will entail but a small drain on the permanent forces of the country, whether Army or Navy; but it must be remembered that torpedo manipulation requires a long and careful training, and that no submarine mines are more efficient than those which are frequently laid down and taken up again.

Before entering into any details for defence by any combination of means now within our power, we must consider what the fleet of the future will be on which we must ultimately depend for the prevention of invasion, for all forms of defence are merely a means of delay, if the force necessary for the purpose can be brought to operate against it. England, notwithstanding her superiority in mercantile shipbuilding, has always taken the lead from France in designs for men-of-war. In the days of sailing vessels the best hulls were those copied from captured line-of-battle ships or frigates. Floating batteries and ironclads were first introduced by France, and they are now ahead of us in the coming arm, viz., the sea-going torpedo-boat. We now hear from France that the days of ironclads, of the present type, are numbered; and that such is really the case I feel perfectly certain, as the destructible ironclad, as I will call it, valued at half a million of money, can be sunk by a locomotive torpedo valued at 400*l.*, discharged from a sea-going torpedo-boat, valued, say, at 25,000*l.* Such an ironclad is unfit to go into action even if she

¹ See footnote on page 683.—Ed.

could be built with a speed equal to that of the torpedo-boat. The first and most natural suggestion would be that each ironclad should, for her own protection, have, say, four sea-going torpedo-boats attached to her to attack the torpedo-boats of the enemy, but even then she would not be safe; for in the smoke and confusion an erratic torpedo-boat might slip within range and cause her destruction. We are thus obliged to come to the conclusion that the ironclad of the future must be absolutely protected against torpedo attack; the torpedo net may be of some use for this purpose whilst a vessel is at anchor or steaming very slowly; but in a general action, when full speed is most desirable, it would be useless. Now, my personal opinion is that, ungainly and horrible as it will appear, we shall be obliged to throw out light, cellular scantling from each side of our vessels to a distance of not less than 12 feet, in order that we may have an air space between the point of explosion of the torpedo and the heavy plating. This will, of course, entail a great loss of speed, but speed will cease to be of such importance when the vessel represents an impregnable citadel, surrounded by a number of fast satellites. It is thus evident that a large increase in the number of our torpedo-boats is absolutely necessary, and that the Government must carry out, sooner or later, a series of experiments as to the protection of ironclads by means of air chambers surrounding the hull.

Now, to revert to coast defence: it appears probable that if the question is taken up seriously during peace-time, we may depend on volunteers for the purpose of protecting our smaller harbours and seaports from desultory warfare; of course the defence of such places as Liverpool, the Clyde, the Humber, Leith, Falmouth, Dublin, and Belfast must be entrusted to regulars, but one point should be clearly and definitely settled. Is the Government responsible for the protection of every point on the coast? They say no; they say they can only be responsible for such stations as are of national importance. The country says that every point must be defended, in proportion to its importance perhaps, but defended, and that the Government shall be responsible. Now it must be clearly borne in mind that an enemy has a right to harass your coast, and that the fact of a town being defenceless would not, under any circumstances, insure its immunity from attack. On the contrary, it would enable an attack to be made by a smaller force; in fact, I am sure you will agree with me that our coast requires a more complete system of defence than at present exists; why even the harbours of the United States are better protected than ours, and many of our Colonies are paying more attention to the subject than the mother country. The necessity for something being done during peace-time was never more completely demonstrated than when we awoke one morning in the past year and found ourselves on what appeared to be the brink of a great war, something very like a panic being the result. Several Defence Associations sprang into existence, each more or less being led away with the idea that torpedoes would do for us what we had neglected to do for ourselves, and keep the enemy from our coast. I grant you that there is some justification for such an idea, and the

defence obtained from torpedoes is comparatively an economical one, more especially if the personnel is provided for by voluntary efforts. There appears to be a growing opinion that but little difficulty would be found in raising local corps for this purpose. It must be remembered, however, that small seaports are not generally very rich, and many of them have but a small population. Likewise it should be borne in mind that their destruction, although entailing no national danger, would be a national insult, which we should all combine to prevent, if possible; so I think we may fairly come to the conclusion that torpedo volunteer corps, if raised, should be put to as little expense as possible and be assisted by voluntary subscriptions. The Government should likewise undertake to find the material of war, including locomotive torpedoes, spar torpedoes, gunboats, guard-boats, torpedo-boats, submarine mines, cables, long-range guns, mortars, and machine-guns; the submarine mines and guns would be supplied by the War Office, the Admiralty providing the other stores, thus distinguishing between the shore defence and what may be called the floating defence. The Naval Volunteer Home Defence Association contemplated raising sufficient funds to enable volunteer corps to possess their own boats and torpedoes, but a little consideration will show that it is not only desirable, but absolutely necessary, that they should be found by the Admiralty. This, I think, we may take for granted will, if done at all, be ultimately done by that department. We will now consider the question of personnel.

As with the stores so with the personnel, separate corps will be necessary. First, a naval volunteer force to man and fight the guard-boats, gunboats, and torpedo-boats, and to manipulate the locomotive and spar torpedo. Second, a military volunteer force to obstruct the Channel with mechanical and electrical mines and to man the machine-guns in position, the guns of shore batteries and mortars.

As regards the naval element, the most readily available and efficient force would be the Coast-guard; but it has been distinctly laid down that on the outbreak of hostilities these men, being most efficient seamen and seamen gunners, would be required for our sea-going fleet. I think, however, that we are neglecting a great source of strength in not taking steps to replace the Coast-guardsmen at the shore stations when they are embarked. There was provision made for this in the original scheme for the organization of the force; it was even contemplated that their places should be filled up when embarked for annual exercise; the only objections to this are as follows:—

First, the men leave their wives and families in their cottages when they embark, consequently the cottages are not available for the temporary hands. Second, the expense of replacing the men for a short period, during which they could be dispensed with. As regards the first objection it would be desirable and necessary, should the men be permanently embarked in time of war, to give the wives of the men afloat a boarding allowance, they could then live with their own families, and the Coast-guard houses be available for others.

Second, in war-time retired Coast-guardsmen or seamen pensioners could be obtained for a small sum of money, and as far as possible men belonging to the naval volunteer force should be taken on. It is not absolutely necessary that these men should be employed when the Coast-guardsmen embark for their six weeks' drill at sea. As an experiment it would be desirable occasionally, but their immediate enrolment and occasional muster cannot be neglected if the coast-guard organization is to be maintained during war. I may here mention that we neglect a great element of coast defence and a means of saving life in case of shipwreck, by not connecting the whole of our Coast-guard stations by telephones, or joining them up with the general telegraph system, in which case they could communicate with passing vessels, and would I believe be self-supporting if worked by the Coast-guardsmen's wives or daughters, who would soon become quite competent to undertake the work. I could give many more reasons why we should maintain the Coast-guard organization perfect in case of war, but the necessity is self-evident, and one can only be astonished why no steps are taken for the purpose. The Coast-guard should provide instructors for the coast volunteers to take charge of locomotive and spar torpedoes, torpedo-boats, guard-boats, and all naval stores.

In addition to the Coast-guard we have a volunteer corps that has hitherto been somewhat isolated, but which if associated with the Coast-guard for coast defence would soon become a valuable addition to our volunteer force; it is called the "Royal Naval Artillery Volunteers," a name that does not clearly convey either the work they have hitherto performed, or that which they would have to undertake if they co-operated with the Coast-guard in the duties enumerated as pertaining to the naval volunteer force for coast defence. Should this force be reconstructed so as to undertake the duties relating to coast defence, they would have to recruit more from the seafaring and fishing population than hitherto, the majority of them at present being men of some means and many of good position in society.

Hitherto they have been instructed in the use of great gun, cutlass, and rifle, they drill frequently in a gun battery on shore having naval fittings, and they embark in a gunboat about once a year for exercise afloat, when they show great zeal in undertaking even the menial duties of the vessel; but if they recruited more from the fishermen class, and were as proposed closely allied to the Submarine Mining Volunteers, it would be necessary for them to receive the 5*l.* capitation grant which is given these volunteers in view of their extra drills, longer hours, wear and tear of clothing, &c.

As regards the present state of the Royal Naval Artillery Volunteers, I cannot do better than to quote and adopt the description made respecting it in an article on Coast Defence, to be found in the "Admiralty and Horse Guards Gazette" of the 2nd May, 1885.

"It is now just twelve years since the Admiralty decided to form the present three brigades, which are limited to London, Liverpool, and Bristol, with batteries at Brighton, Hastings, Southport, Birkenhead, Bangor, Carnarvon, and Swansea. In spite of the Government

having hitherto failed to recognise their status (by the withholding of a capitation grant), these brigades are in a most efficient condition, and repeated applications have been made from other quarters for an extension of the movement. It was hoped when Sir Thomas Brassey took office that the Admiralty would see their way to acceding to these requests, and to organizing the force on a more permanent basis; but probably, owing to the slight additional expense that would be entailed by the grant of a capitation allowance, which has been recognized as necessary for the efficient maintenance of the force, no steps have hitherto been taken to tap this promising source for adding to the defensive strength of the country. If, however, as we suppose, the services of the Royal Navy and of the Royal Naval Reserve are required for other purposes than the defence of our coasts, now would appear to be the proper time for urging the claims of the Royal Naval Artillery Volunteers to take up their recognized place in the defence of our mercantile harbours and seaports. Every port in the kingdom should be invited to raise a battery of sixty to eighty men for local defence. Each battery should have attached to it a retired Officer of the Navy. The men should be supplied with boats, and those knowing intimately the channels and coast in the neighbourhood should be used to man torpedo-boats. We feel sure that were such an invitation issued, it would meet with a hearty response, and that large numbers of our fishing population would readily join the force, providing a capitation grant was allowed to defray incidental expenses. It might, perhaps, be necessary to give a slight increase of retired pay to naval Officers who joined the force, or better still, to allow time served with the batteries to count in a certain proportion towards increase of pension on final retirement. Half-pay Officers of Commander's rank or Gunnery Lieutenants should be selected by the Admiralty to command districts of ten or twelve batteries. The functions of the force would be two-fold—land defence and sea defence. The first would consist in the defence of coast batteries mounting naval guns; the battery to be masked if possible, and with as near an approach to all-round fire as practicable. The men should be trained in the rifle and cutlass exercises as taught in the Royal Navy. The sections for sea defence would be specially trained in the system of torpedo warfare from shore or boat, and would form the *élite* of the local force, consisting only of men thoroughly acquainted with the coast and with the set of the tides in the neighbourhood of the port. Steam launches should be attached to the various harbours for their use, a chief stoker, or engine-room artificer, from the Navy, being charged to look after the engines. An instructing Officer, occupying the position now held by Adjutants in the Rifle Volunteers, should be placed over a number of districts. His duty it should be to go round and inspect the various batteries from time to time, and to report on each occasion to the Admiral Superintendent of Naval Reserves. Under him, retired gunners should act as instructors. In order to recruit such a force a capitation grant is an absolute necessity; probably 30s. for all men qualified to take part in land defence, and a somewhat higher rate, say 50s., for those efficiently trained for sea defence, the wear

and tear of clothing being greater in their case, would be sufficient. The extension of the Naval Artillery Volunteers would offer a good opportunity for utilizing the previous training of naval Officers on retirement. At present the expensive training of Officers is practically lost to the country as soon as from age, or from private reasons, they quit the Service, and after a few years of vegetation they become unfitted for employment through having lost touch of the Service and of the improvements made in naval warfare. If, however, Officers of known efficiency were invited on retirement to accept appointments in the Naval Artillery Volunteers, we feel sure that many of them would be willing to serve their country in such a capacity."

We will now consider the organization of the military volunteer force for the purpose of coast defence. Of course, wherever there are War Office stores there must be a small permanent staff to take charge of them, these men would thus also be available for organizing and instructing the necessary volunteer corps. Several ports have already started such a corps under the name of Trained Volunteer Submarine Miners; they have been assisted by the Government by having instruction imparted to them, by having their stores given them, and by a 5*l.* capitation grant. I think we may assume that what has been done is only an indication of the facility with which the movement may be extended. It would now be desirable to consider how far the Government would be willing to adopt the suggestions now made, and I am afraid we are bound to come to the conclusion that unless public opinion is asserted in a more decided manner than appears likely at present, coast defence will not be taken up in earnest. Whenever a war scare is started, spasmodic efforts are made for the time and then die out. During the scare of 1885 two organizations—"the Empire Defence League" and "the Naval Volunteer Home Defence Association"—sprang into existence, the latter being an amalgamation of two others then started, and the former being designed to bring moral influence to bear on the subject. The Naval Volunteer Home Defence Association attempted to collect funds from the country in general in order to assist the seaports in raising the necessary material for coast defence without appealing to the Government, and to assist in providing funds for raising the necessary volunteer corps. Both of these associations have failed, the Government has resisted the moral suasion, and public opinion appears to be decidedly adverse to any attempt to raise the necessary funds for torpedo-boats, &c., by public subscription, whilst, on the other hand, the Government distinctly state that they can only be held responsible for the security of those large centres of trade, the destruction of which would be attended with serious consequences to the nation in general. In answer to a question put in the House of Lords in July last, the Earl of Harrowby, in a spirited speech in which the importance of the subject was acknowledged, stated, "The naval requirements for such defence were two—material and men. Ships, of course, were wanted, torpedo-boats and everything connected with them, also steam-tugs of sufficient speed to be used as gunboats. The present opinion of the Admiralty after taking the best advice was, that they ought to

rely upon support other than that of the Government, and he hoped that the localities and patriotic associations would be able to supply material for the movement."

Now, everyone acquainted with the cost of the articles enumerated amongst the necessary material would see the impossibility of raising sufficient funds by voluntary efforts. The following list of places are already more or less defended, and may be considered of first class importance; for these the Executive Government should be entirely responsible, and their defences should be completed without loss of time; their torpedoes, cables, &c., should be stored on the spot, and be occasionally laid down for exercise.

Military ports—Portland and Dover Dockyards, Portsmouth, Plymouth, Pembroke, Cork, Sheerness, and Chatham.

Commercial ports of first class importance—London, Liverpool, Holyhead, the Humber, Clyde, Southampton, the Forth, the Tyne, the Tees, Bristol, Swansea, Dublin, Belfast, Sunderland, Folkestone, Newhaven.

This list alone must remind many of my hearers how much requires to be done to defend our coast. Fortunately our principal commercial ports are situated upon navigable rivers well adapted for defence by ground mines and torpedoes. London is well up the Thames, Glasgow up the Clyde, Newcastle up the Tyne, and Liverpool up the Mersey; they can, therefore, be made absolutely safe from naval attack by sealing the mouth of the river.

The ports of secondary importance which might be entrusted to volunteers are—Harwich, Yarmouth, Lowestoft, the Tay, Aberdeen, Wick, Thurso, Ramsgate, Rye, Littlehampton, Poole, Dartmouth, Barnstaple and Bideford Bay, Wexford, Waterford, Kinsale, Galway, as well as many wealthy open watering places. The question now remaining for solution is the modifications required for the defence of ports by reason of the introduction of ironclads, heavy guns, electrical and ground mines, torpedoes and torpedo-boats. Against ironclads and heavy guns there is nothing more efficient than mortars, they penetrate all decks of an ironclad, and pass out through her bottom. It is frequently believed that they would never hit a moving object on account of their trajectory being at so high an angle, but when the distance is accurately known, as in a narrow channel, and the powder is trustworthy—as is not always the case—there is but little deviation from the spot the projectile should fall on; besides it must be remembered that even rifled mortars are comparatively cheap, the sunk batteries they are fired from are easily and rapidly constructed, and at least twelve mortars could be mounted in the space occupied by two heavy guns. In those mortar batteries I have seen designed, the battery could be rapidly cleared of men by means of tunnels and chambers built in the earthwork, and the mortars fired in a bouquet by observations taken from a favourable position. Mortar batteries, of course, would only be required for first class ports likely to be attacked by ironclads. They may, however, be considered a modern form of defence when used against a naval attack, but they are thought very highly of in the United States. Some very perfect mortar

batteries have been constructed for the defence of Boston, U. S. A., and other ports. But even with mortar batteries the ironclads would have forced their way wherever there was water enough for them to float, had it not been for the development of torpedoes. Now I would not have you exaggerate the importance of torpedoes, they require very favourable circumstances to be impregnable; for instance, if they are not protected by machine-guns and torpedo-boats they are simply an impediment that will delay the advance of the enemy by a few hours, who would only have been put to the expense and delay of countermining. We may, therefore, assume that whenever ground mines are used, torpedo-boats, machine-guns, either mounted on shore or in guard-boats, are necessary. A heavy gun in position having a long range would also be desirable even in ports of secondary importance.

Having made these preliminary remarks, I will proceed to state briefly the minimum amount of preparation necessary to form the basis for the development of the defence of our first and second class commercial ports in case of war, without touching on the question of defence of military ports and dockyards.

Our first class commercial ports are, as I have before stated, generally situated some distance up a navigable river, and are consequently easily defended from naval attack by a combination of electrical and mechanical ground mines and torpedoes, supposing vessels of sufficiently light draft for countermining are not allowed to approach the defended position. I say nothing of the approach of ironclads, so long as the torpedo field is intact, as I consider we may ignore any attempt at countermining being made by such a valuable weapon, the submarine mines would be defended when practicable by heavy guns and machine-guns mounted on shore, and by guard-boats and torpedo-boats afloat. Much, however, has already been done and is being done for the defence of first class commercial ports.

As regards the number of guns mounted on shore, two might be considered sufficient if they covered the whole of the torpedo ground. If it were not for the expense, forts built in the water near the main channel would be in the best situation for defending submarine mines and utilizing electrically steered and locomotive torpedoes.

There are good specimens of these in the circular forts at Spithead, and in the more elaborate and expensive structure being erected for defending the narrow approach to the town of Baltimore, U. S. A. In both of these cases the forts are protected by iron plates, and may be made practically impregnable against horizontal fire, as there is no limit to the thickness of iron such a fort can be made to carry—I say “made to carry” advisedly, as they have not hitherto invariably succeeded in carrying their armour; one of the Spithead forts having been abandoned from the foundation giving way, and about 40 yards of the fort at Baltimore having to be reconstructed for the same reason. This, however, is merely a question of construction, and I would suggest smaller forts, with a concrete base twice as large as the foundation of the fort.

Any fort, however, built in the water must be expensive, and where

a projecting point of land is available, a two-gun earthwork of sufficient strength to resist the fire of the guns of any vessel likely to be used for the purpose of attacking such a position would be cheaper and nearly as effective: remarking, that in some of the American earthworks designed for this purpose, a thickness of parapet of not less than 60 feet is deemed necessary, and the guns are mounted on disappearing platforms, a form of fire coming rapidly into favour in England.

I would now try to impress on my hearers the advisability of constructing torpedo-boats capable of almost total submersion, having a cupola of only 4 or 5 feet in diameter exposed to the fire of the enemy when at deep draft, the cupola having sufficient thickness of metal to neglect the fire of machine-guns; the light draft speed should not be less than 20 knots, the deep draft speed would probably be about 14 knots, at which rate, with her small exposed surface, she might risk the fire of the heavy guns of the enemy. Such a boat would be armed with a Whitehead torpedo discharged through the point of the bow, or else with an Ericson torpedo of small diameter, discharged from the same position, and capable of penetrating a torpedo-net. This boat might discharge its projectile at a distance of not less than 20 yards from the enemy, without being involved in the effects of the explosion. This I may add would not be the case if she were a submarine boat, immersed even 5 feet below the surface. For some purposes, however, the power of total submersion, as with the Nordenfelt boat, would have its advantages, such, for instance, as her capability of firing under the net, a power she would have to exercise with considerable caution and at no slight distance off, otherwise she would be included in the area of explosion, as has hitherto been the case when submarine boats have succeeded in the destruction of their opponents.

Another drawback to submarine boats is the impossibility of seeing the enemy when under water, and the difficulty, under similar circumstances, of steering a compass course with sufficient accuracy to ensure finding her, if the object should be to attach a delayed-action torpedo and retire. I have no doubt whatever that our gallant Torpedoists will think nothing of these objections, and may shortly succeed in developing on the lines mentioned, or in some other form, the usefulness of this plan of attack.

As regards the guard-boats for the defence of submarine mines, it would be very desirable if life-boats could be constructed to carry machine-guns, in order that they might be utilized for this purpose. Of course this would necessitate propulsion by steam; and that steam life-boats have not already been generally adopted seems to many a mistake. For instance, where tugs are available they are used to assist the life-boat in getting to windward of the wreck she is required to assist. An objection might be raised as to delay in getting up steam, but with coil boilers such as the Herreschoff 48-foot steam pinnaces, which I sent from America five years since, steam could be raised in five minutes. The engine-rooms and cabins are hermetically sealed fore and aft, with the exception of a 10-feet well abaft, the deck of

which is above the water-line, having self-clearing valves as in the ordinary life-boat, there is a forced draught of air into the engine-room, the pressure being maintained about two pounds above the atmosphere. The only objection to this class of boat has been the small amount of water contained in the coil tubes, and this defect has lately been overcome. Such a boat requiring stokers and skilled labour would have to be manned by the Coast-guard, but they already man many life-boats, more especially when they are launched for active service.

The number of the torpedo-boats to be supplied by the Admiralty need not at first be very great, as they would only be required for drill purposes, and could, as is the case now with the gunboats used for embarking Royal Naval Artillery Volunteers, be passed from station to station for that duty, the Officer in command and small staff being retained.

Before concluding I would draw your attention to the small extent to which our mercantile marine contributes towards our national defence, and which I am sure must be deplored by every true lover of his country. Considering the reserve of 80,000 possessed by the French, we might fairly ask for a first and second class Naval Reserve of 40,000 men, a proportion of whom might be raised in the Colonies and drilled on board our men-of-war.

The comparatively small number of seamen now entered in our Naval Reserve is due to the large proportion of foreign seamen who man the merchant vessels now sailing under the British flag. The true mercantile British sailor who up to thirty years since took so large a part in the manning our ships of war still exists in reduced numbers, and as such has come forward readily to form our existing Naval Reserve: the fact that there are not more reserve men is simply because there are no more of the same stamp to enlist. We might fairly refuse to grant any vessel the use of the British flag unless the majority of her seamen were British subjects. It may be argued that freight is now so low that vessels could not afford to run at all if they had to pay the high wages demanded by British seamen; it must be remembered, however, that the reserve men are to a certain extent subsidized and provided for in their old age, consequently are eagerly sought after. The number of British seamen and of reserve men could be readily increased by giving a certain proportion of the boys educated in our training ships, on attaining the age of nineteen, the option of leaving the Navy and joining the Naval Reserve for ten years, instead of as at present serving the same time in a man-of-war. Of course a proportional increase would have to be made in the number of boys entered in our training ships. This is, however, a question more affecting the reserve of our fleet than actual coast defence, but some now present may remember the efforts made previous to the Crimean War by a small but earnest body of our fellow countrymen to point out what was palpable to every seaport labourer, that, whilst we had sufficient ships to quadruple our fleet, we had no seamen to man them.

The Crimean War exposed the calamitous position our Navy had

drifted into. In those days a British fleet had to be sent to sea with three-quarters of their crew consisting of landmen who had never been to sea before, combined with a small proportion of the scum of Tower Hill who generally deserted; the small body of seamen gunners (thirty) and the marines alone rendered such an attempt possible.

Fortunately in those days the French were our allies, and we had only the Russian fleet against us. This led to the question of manning our fleet being seriously taken in hand, and right well did the Admiralty deal with it. The continuous service was established and all men-of-war seamen now enter for 10 years instead of 3. Boys are entered at the age of 14½ and trained, so that at the age of 19 years, when they commence their 10 years' servitude, they are better instructed in their gunnery drill than an able seaman used to be when the ship had been one year in commission, and possess nearly as good physique. Men now get their pension sooner, generally before being 40 years of age, and consequently are available for Pensioners' Reserve.

The Coast-guard that was previously under the Board of Trade, and contained but few men of any use in a man-of-war, was transferred to the Admiralty, and now consists of the pick of the fleet; these men are available for embarkation within forty-eight hours. The select of the merchant service likewise form an additional reserve of men who, besides being seamen, have an annual training in gunnery and small arms. We have also that fine body of men the Marines, who combine in an eminent degree efficiency and economy. All these have tended to produce, within the last thirty years, a comparatively satisfactory result as regards our capability of manning our men-of-war in case of emergency. But, on the other hand, it must be remembered that during the same period, in spite of the additional expenditure entailed by the general adoption of steam and the necessary machinery; of the introduction of iron instead of wood for the hull, and the fitting of thick iron plates to the sides; of a more complicated and expensive armament, necessitating carriages that are of themselves an effort of art; of the introduction of torpedoes, electric light, &c., yet the country has consistently adopted a policy of attempting to reconstruct our Navy on the ordinary estimates, with a result that, even after one or two spasmodic efforts to augment our fleet,—resulting from scares, which caused a great waste of money,—we should, if war broke out to-morrow, find ourselves with a reserve of ships and torpedo-boats unequal to the requirements of the fleet alone, and consequently with none available for coast defence. I therefore advocate strongly an extension of our Volunteer movement for this purpose, feeling certain that if the Government will supply small detachments of Royal Engineers, consent to our Coast-guardsmen being replaced as fast as they are embarked, and supply the necessary stores, the patriotism that, contrary to the opinion of all Europe, carried our military Volunteer system through, will also make our Volunteer Coast Defence a success.

The calculation of 500 first class merchant ships, on page 673, is based on the number of merchant vessels permanently employed for the conveyance of the army

which captured Pekin in 1859—after the landing of the troops, horses, artillery, &c.; they were anchored off the Taku Forts, having on board, besides three months' provisions, stores and ammunition, thus forming a base of operation for the army. The possibility of landing 75,000 men without provisions and reserve of stores was never contemplated. (30th June, 1886.)—W.A.

Captain W. F. S. MANN, R.N. : The paper we have just heard, following those of Major Elsdale on the "Defence of London," brings before us the whole question of the defence of the country from various points of view in case of war or invasion. A naval man speaking on this subject cannot be accused of saying "there is nothing like leather," as it is an undisputed fact that the Navy is our first line of defence. I am one of many who believe that this object, namely, the defence of the country, can best be obtained by keeping our Navy at such a strength as to be always ready to take the offensive—for I hold that our tactics should always be offensive—in any probable combination against us, having as its base fortified ports and properly organized coast defence. If these two offensive lines of defence, if I may say so, are strong, not a man should ever be able to land on our coasts. The two points that seem to me to be of the greatest importance in the consideration of this paper are, first, Is the Navy still as capable of defending our shores as it has hitherto been? and secondly, Has steam given the invader or the defender the most advantage? Admiral Arthur answers the first question in the negative. If that be the case let us make it so. All the money that can be got out of the Treasury, and our Chairman probably knows better than anybody else how difficult it is to get it, should be spent in this direction. What is the good of having a first line of defence not really strong—merely a make-believe? Our naval defensive strength should be beyond question; these are the words of the Chairman in a letter that he wrote to yesterday's "Times," and everybody knows they are true. In answer to the second question Admiral Arthur says, "We may assume that steam is favourable to desultory attack but opposed to organized invasion, except under circumstances in which naval opposition could not be attempted." I suppose we must all agree in that; it seems to be unanimously the opinion that an invasion could not be attempted unless the enemy had command of the sea for a considerable period. I know there are people who believe that owing to most extraordinary complications conditions would arise which would make that probable; so we should be prepared for that, but, on the other hand, we should beware of going to the other extreme. I cannot imagine that this country could be left entirely without any naval force. I do not think it is an absurd simile to ask, "Would a man who owns a London house if he were going to the sea-side dismiss his servants and leave the whole of his windows and doors open?" But supposing all the ships, including coast defence vessels, gunboats, torpedo-boats, &c., were absent, this is where steam would come in to our advantage, it would be quite impossible for the enemy to collect vessels to contain a force even 75,000 strong without our being aware of it (I understand that the military authorities consider that invasion would not be attempted with less than 150,000). Admiral Arthur says that 500 first-class merchant ships would be required to carry 75,000 troops. I venture to doubt that; we know what number of ships was required to take 16,000 men to Egypt, and that was for a long sea voyage; of course for a short sea voyage at least double the number could be carried by each ship. These transports would have to be prepared for reception of troops, horses, pontoons, &c., which would take a good deal of time. I think, therefore, there would be ample time for us to recall our forces if they were scattered. Imagine what a few "Hotspurs," "Polyphemuses," torpedo and gunboats would be able to do amongst a great mob of merchant steam-ships full of sea-sick soldiers. Still, we ought to be prepared for all emergencies, so I should vote for the protection of the country on the lines I have laid down, which, if carried out, would prevent panics, also that waste of public money when they periodically occur.¹

¹ What occurred in the past when wind was the only motive power could not happen in the present, steam and electricity have entirely altered the conditions, making them more favourable for the defender in case of attack on our coasts or invasion.

Captain Sir ROBERT MOLYNEUX, A.D.C., K.C.B., R.N. : I wish, Sir Astley Cooper, to offer a few remarks upon this paper. I am sure that we are very sorry that Admiral Arthur is not able to read it himself, but I think that if it be successful in reawakening an interest in this very important question it will have done very good service to the country. I will first allude to the point in the lecture on the subject of the Naval Volunteers. I see there are one or two Officers here who are very much better qualified to speak about them than I am, and therefore my remarks will be few. My experience of them is that they want reorganization. Of course they would be very glad to have a larger capitation grant, but they must first show that the reorganized force can take a distinct part in the national defence, they will then thoroughly deserve an increased capitation grant, and I hope they will get it. No doubt in time they will. In these days seamen alone are not of the slightest use on our torpedo-boats, guard-ships, &c. You require men qualified to fill a great many other departments, and Volunteers must see the necessity of taking steps to include in their ranks men qualified to fill all those departments required on board ship. When they have done that they will be able to hold a very important part in the defence of the country, and will deserve every encouragement. But there is an encouragement that they want, and which they can have quite independent of money—they want a little more recognition. There are many opportunities in which I think the Naval Artillery Volunteers could be more associated with the Navy, for instance, at the experiments last year at Bantry Bay, or at those contemplated this year at Milford Haven, a very good opportunity would be offered by such operations for the Volunteers to perform duties in every respect exactly similar to those of our seamen. I do not suppose for a moment they would expect to become the rivals of our seamen, but it would give them instruction, it would bring them into notice, and the harder you work them, the more they like it. I am quite certain that it would have more effect than even an increased capitation grant. There is another point, a very important one, but it is perhaps rather beyond the limits of the paper, namely, the question of Officers. This question of training Officers for the reserves is a very difficult one, especially with reference to Volunteers. I do not think myself that the retired naval Officers, although they would contribute towards it, would, as suggested in the paper, be able to supply the want. In the first place there are not enough of them who have been recently employed in the Service, and, as a rule, when they retire they naturally have risen rather towards the higher ranks. You want a lot of young active men prepared to do a good deal of hard and yet responsible work. The retired Commanders and Officers of higher rank would hardly care about this, and therefore it becomes a very important and difficult question, but one which at the same time should be thought out and faced—how we are to train Officers to man all these gunboats and torpedo-boats?—because the Royal Navy would not be able to supply them without making great sacrifices in other directions. Whether true or not that the days of ironclads are passing away, there will certainly be large numbers of gunboats and torpedo-boats employed in any future war, when the number of highly trained Officers, and also of highly trained men, that will be required will be very much larger in proportion to what it is at present; that is a thing that ought to be taken into consideration at once. You cannot make a gunboat commander, or a torpedo-boat commander, or even a torpedo-boat stoker, in a day, and whether it be the Volunteers, the merchant seamen, or the fishermen class that are to supply this want, they ought to be found at once and trained without regard to expense.

Lieutenant-Commander C. E. SETH-SMITH, Royal Naval Artillery Volunteers : I should not venture to address this meeting, comprising as it does distinguished Officers of both Services, among whom I see several who have given special attention to this subject, but for the fact that in Admiral Arthur's paper there is frequent reference made to the Naval Volunteers, whose position he very courteously described as having hitherto been *somewhat isolated*. He points out, as has been pointed out frequently in this Institution and elsewhere, and by no one more clearly than yourself, Sir, that England cannot expect the Royal Navy to undertake the defence of commercial ports. It is a recognized thing, I think, that no invasion need be feared except after some such disaster as Captain Mann seems to think is almost impossible, but accidents happen even in the best regulated of Her Majesty's ships, and it is possible

we know that such an accident may happen to our Fleet and Army as may involve the deplorable necessity of calling upon the Volunteer Reserves of the country to defend their shores. Admiral Arthur speaks, and so does Sir Robert Molyneux, of the want of encouragement from which Naval Volunteers have suffered in past years, but when we consider how many years and how much perseverance it took before the Army Volunteers attained their present recognized position, I do not think it is altogether unnatural to expect that the Naval Volunteers must also go through a long time of probation. One great reason, perhaps, why this encouragement has not been given so freely as the Volunteers would have liked, is the fact that hitherto, in all your schemes of coast defence, the Admiralty, I understand, have failed to see in what way the Naval Volunteers could be utilized, and of course, if you cannot see how to utilize the force, it is difficult to give that force encouragement. But I do think the thanks of the supporters of the Naval Volunteer movement throughout the country are due to Admiral Arthur for so clearly pointing out that there is some part, and a not dishonourable part, that the Naval Volunteers can take in the defence of the country, whether it be relieving the Coast-guard or manning the guard-ships and torpedo-boats, or even in assisting the new submarine mining engineers. When Admiral Hamilton, who during the war scare was appointed more particularly to inquire into the position and resources of the Naval Volunteers, did me the honour of allowing me to assist him, I was able to assure him that the Naval Volunteers were willing to place themselves unreservedly in his hands, or in the hands of anyone appointed by the Admiralty; that they were willing to undergo any instruction he should think fit to give them; and that they had no desire to dictate any terms whatever. The feeling of the Naval Volunteers throughout the country is to try and be of some use, and of course they must leave it to the higher authorities to say in what way they can be employed. If they will only tell them that and show them how they can get the needful instruction, the Naval Volunteers are only too anxious to learn anything that may be thought fit to learn. I have also endeavoured so to assure Sir Robert Molyneux, who is continuing the work commenced by Admiral Hamilton, and I am very much obliged to him for saying in this Institution, that he is aware of the fact that the only kind of encouragement the Volunteers want is to be recognized as being willing to try and do what work lies in their power, and as he says, "the harder you work them the better they like it." Admiral Arthur calls attention in his paper to this point, that the Government say they are not responsible for the defence of every point upon the coast, but only for certain important stations. With reference to that he adds, "The country says that every point must be defended, in proportion to its importance, perhaps, but defended, and that the Government shall be responsible." If I read the signs of the times aright, I think the country says more than that; it says every place must be defended, and it says that these places are willing to defend themselves so far as in them lies. It is well known by a great many members here present, that from nearly all our seaports and towns round the coast offers of service from men as Naval Volunteers have been forwarded to the proper authorities. I think that is a clear proof the country is no longer apathetic on this point. Of course one understands there must be some delay in saying either yes or no to such offers, but it should be clearly understood, certainly in this Institution and by the regular Services, that there are those who have not the honour of belonging to either of the regular Services, yet still are Englishmen, and anxious to do what in them lies to serve their country, and that there are those on the coast willing to place the special knowledge they possess in the way of local pilotage and experience gained, either in the exercise of their calling or in pursuit of nautical pastimes, entirely at the disposal of the Admiralty, provided only that "my Lords" at the Admiralty will take them up and place themselves at the head of the movement, as a Naval Volunteer force, but the *naval* element must be distinctly recognized, as far as it goes. I think when this paper is published, the Naval Volunteers everywhere will feel really grateful to Admiral Arthur for pointing out so clearly that at any rate in his scheme for coast defence, "Naval Volunteers" have a place.

Captain CURTIS: This is rather an old tale, the defence of our shores, and a great many of the gallant Officers here will recollect how in 1858 or 1859 there was a great scare, and the Royal Naval Coast Volunteers were then formed. Having been

First Lieutenant of the Coast-guard ship at Liverpool, I had a very good opportunity of judging of the men who were then enlisted, and really if half the men had been kept instead of disbanded, they would have been a very efficient force for those times. They were Manx men, fishermen and coast fishermen. The force was got together in too much haste, and many of the men, I consider, were over the desirable age, say twenty-five years. But, as far as my experience goes, I decidedly object to enlisting men more than twenty-one or twenty-two years of age. Fisher lads, barge lads, and long-shore lads from sixteen to seventeen, should be encouraged. I think there should be two classes, a first and second class, and a boy and man class, and they should pass from the boy into the man class at nineteen years of age, if qualified. I have been at Yarmouth, where there is a large Institution where they board the fisher lads when they are not out at sea, and where there are some 200 or 300 lads.¹ You could get the whole of those lads, I should imagine, in a reserve force, *graft them into the Navy*, as it were. When you get hold of a man over twenty-one, his ideas are formed, and it is very difficult to get out of his head what he has got in it. I say those, the young lads, are pliable, and the proper class to recruit from, and I think in the course of ten years, if the Government will look up these lads, they will have a very efficient force. With respect to the foreign fleets, what they will do will be to destroy our commerce, our most vulnerable point. They will not come to Spithead, though they might fire a shot at Brighton if they found a ship was not there. Admiral Arthur seems to suggest that we are to send a ship afloat in a dry dock, that is to say, we are to have air tubes round her, and those air tubes must be 12 feet from the real ship. By what authority he suggests such an affair I know not. It appears to me, from the little I understand of the subject, that Sir Edward Reed is much nearer the point, that is, by having corrugated tubes to contain water, round and under the ship, fitted with some slight air escape.² With reference to the Coast-guard, they are very efficient men, and really to be depended upon, and so were the old naval trained Coast-guard men. I know that when we commissioned in the "Royal Albert," in May, 1854, there were Royal Artillery men who turned some of our rigging in. We could not get to sea till October, and we had to get the Coast-guard men from the Baltic Fleet when they came home for the winter. The real point after all is that the money expended on the Navy is only an insurance on our commerce. The cost of the Navy should be 15 millions a year, or only 1½ per cent. on our 1,000 millions of commerce. The Army costs 16½ millions. Everybody acknowledges that the Navy is the right arm of the country. It is well known amongst naval men, 11 millions is not sufficient to keep up an efficient Navy for the duty it has to perform; the Service has been starved for years. Why then begrudge the money? It is only an insurance on our commerce, and a very small one too.³

Professor LAUGHTON: There are one or two points in Admiral Arthur's paper to which, with your permission, I should like to call attention. And firstly, as to what Captain Mann has said⁴ about the proper means of coast defence being such

¹ At Hull and Great Grimsby there are no doubt many young fisher lads that would join a reserve force, "if adequately remunerated."

² These tubes could, if required, be pumped clear of the water in them.

³ I beg respectfully to recommend to Naval Officers the "Study of Fluids," by Stanley, published by E. and F. Spon. It is a work that should be in every first-class ship's library. I venture to assert, if this book had been studied, the costly mistakes of ships steering badly, and the erratic behaviour of torpedoes, would have been remedied sooner, or possibly would not have occurred.

⁴ After the meeting Captain Mann told me that I had misunderstood him; that he had not meant in any way to deprecate measures for coast defence, but only to urge that it should be subordinated to a powerful seagoing force; that the first element of defence should be the command of the sea. With that I fully agree; but the instance I have given—which is only one of many—shows that, however strong the fleet may be, an active enemy may evade it, and find some unguarded place.—J. K. L.

an increase of our seagoing Navy as would wipe the enemy off the sea. In considering a question of this kind it is always well to look back to what has been done in years gone by; because we may fairly suppose that what has been may, under similar circumstances, again be. From this point of view the teaching of the past is this, that in the whole course of our history at no time has the superiority of our Navy over that of the enemy been more manifest than in 1760, when Hawke and Boscawen had completely crushed the French Navy; when our ships cruized unmolested in the Bay of Biscay, or lay peaceably at anchor in the French roadsteads, and that this was the particular time when Thurot made his celebrated descent on our coast. He landed at Carrickfergus; and, but for the disputes among his own people, would unquestionably have sacked Belfast. Owing to those disputes he had to leave Belfast Bay, without inflicting any very serious damage, and was destroyed just outside by Captain Elliot. This is all matter of familiar history; but it is worth recalling on the present occasion, because that insult to our coast happened at the very time when our Navy was at its strongest, and the Navy of the enemy at its weakest. It is a striking instance in support of what Admiral Arthur has urged, that it does not do to trust for the defence of our coast entirely to the seagoing Navy: we want also some system of home defence. Other instances might be given, but this is perhaps the most striking. I have noted Admiral Arthur's reference to the institution of the "Sea Fencibles;" and though he does not say much about them, the inference is that he thinks some similar organization might, perhaps, be adopted. It is therefore well to remind the meeting that in 1801, when Lord Nelson was appointed to the command of the defence flotilla, and had charge of the coast from Lowestoft to Dungeness, he wrote—towards the close of his command—that the establishment of "Sea Fencibles" was bad, and that not a man of them, or very few of them, had come forward when wanted. Of course that is no argument against an establishment of "Sea Fencibles," but it points out that that particular form of establishment did not answer the purpose for which it was instituted. Admiral Arthur, speaking of a possible superiority of the enemy in the Channel, says, that if we were outnumbered by hostile ironclads, there would be nothing for it but a land fight for existence within our own borders. It unquestionably is, or ought to be, the first consideration with our Admiralty to prevent such a possibility; but historically the inference is not quite correct. Once at least the hypothetical case happened. In 1779 the enemy, with an overwhelming superiority, had possession of the Channel for several weeks, but did not succeed in invading the country. That they did not do so was, however, through their own bad management, not through any defensive action of ours. Admiral Arthur has thrown out a most important and valuable suggestion that the Government might refuse to grant the use of the British flag to any vessel, unless the majority of her seamen were British subjects. It is one to which I should like to offer my very small endorsement. It is a point that I myself have more than once raised in this theatre, and which seems to me to go home to the very heart of the matter. As long as the bulk of the mercantile seamen sailing under the British flag are Swedes, Danes, Russians, Greeks, Turks, Chinese, and Malays, it is very clear that the mercantile marine cannot be that feeder to the Navy, and that support in time of need, which it ought to be, and of old used to be.

Colonel CAMERON, Commanding 4th Durham Artillery Volunteers: In Admiral Arthur's paper, he remarks that "fortunately our commercial ports are situated upon navigable rivers," but he says nothing much about commercial ports that are abutting upon the sea. I live at Hartlepool, and at that port we have an artillery volunteer corps of eight batteries, who are men well versed in gunnery, but unfortunately we have no guns with which to protect the port. Although there are between 200 and 300 steamers registered at that port, we have nothing to defend them with but two 40-pounder and two or three 64-pounder guns. I think at a seaport like Hartlepool, open to a hostile fleet, where immediately outside the harbour and docks man-of-war ships could anchor and shell the town, in a place like that powerful guns of position should be placed, which could be easily used by artillery volunteers. The artillery volunteers are well capable of manning those guns; they go to Shoeburyness every year and use the

10-inch guns; they never see that gun except when they go there, and yet after drilling a few times with it, they are able to manipulate it almost as well as the Royal Artillery men themselves. I wish to urge upon the authorities that we at Hartlepool should be provided with powerful guns of position, so as to enable us to defend the place if ever it is required.

Admiral Boys: Before the discussion closes I should like to make a few remarks with reference to Admiral Arthur's paper. I regret very much the cause of my good friend Admiral Arthur's absence, and I must congratulate him on the subject which he has brought before us so efficiently. One of my remarks has reference to the matériel and the other the personnel of the Navy. Admiral Arthur implies in his paper, and this view is taken up by a great many naval Officers and others—Sir Robert Molyneux has just touched upon the point—viz., that the torpedo is a weapon that whenever it is launched against an enemy's ship it is to be effective, and that consequently the days of large ironclads are coming to a close. My conclusions are directly the contrary; my opinion is simply this, that the torpedo is a most uncertain weapon in the first place, and then, secondly, even if it strikes a ship, it does not follow that that ship is to be necessarily destroyed; it is generally implied that it will be so, and especially by the torpedo Officers themselves. They no doubt think the torpedo is the most serious weapon that we have to deal with; they are educated to think so, and it is clear this paper is written by one of them; but I must say that I think the introduction of the torpedo is only an argument for the necessity of very large vessels, for this reason, that the effect of a torpedo that would sink a small vessel would be scarcely felt by a large one with great floating power, especially if means were taken for her protection. I cannot quite agree with Admiral Arthur's suggestion of a cellular scantling projecting 12 feet from the side of the ship. I think the result of that would be something like the boy learning to swim with bladders, who when he jumped into the water found that the bladders slipped down to his feet, and he floated head downwards. I think that any such construction would materially affect the stability of a ship; but by numerous cellular divisions, or by some modification of Sir Edward Reed's arrangement, a practical and considerable defence may be given against the blow of a torpedo. I regret to find that the opinion is getting so general throughout the country, that the days of large ironclads are gone; it is a very popular one and a very convenient one for the authorities, as no doubt Sir Cooper Key knows, looking at the great difficulty of getting money for the Navy, and especially at the vast sum that is swallowed up in one large ironclad. At the same time it is not fair to expect our Officers and men to do what their forefathers did before them, if we place them in ships inferior in any single point of armour protection, armament, or speed, and expect them to conquer their enemies with those inferior weapons. I say it is not a fair position in which to place our Navy. We must remember the old prestige of our line-of-battle ships, frigates, and our sailing has been practically abolished by the introduction of steam and mechanical appliances. An English man-of-war was always considered more than a match for any of her class in former days, but I am sorry to say the time has come when that belief may be a fallacy. An English sailor will do his best, no doubt, and will be equal to any man, but we cannot infer because he is an English seaman that with inferior means he is to be superior to his enemy. The other point upon which I wish to speak has almost been taken out of my mouth by Mr. Laughton. It was with reference to the Naval Reserves in our merchant ships. I quite agree with Admiral Arthur that it is incumbent upon the authorities as far as possible to bring forward by some means or other those British merchant shipowners that do not employ foreign seamen. I may instance two competing lines of merchant Australian steamers, the "Peninsular and Oriental," and the "Orient." The Peninsular and Oriental ships are manned with very few Englishmen; the Officers are English and some of the petty officers, but the majority of the seamen are Lascars, and I believe the majority of stokers are not Englishmen. In the Orient Line they do not take any foreigners at all. I think the Government should really encourage such conditions, which they might do by giving a preference for transport duty, by mail subsidies, or by placing them first on the Admiralty List, and I think it is only right that they should have that preference with a view to increasing the Naval Reserve. In the matter of the Naval Volunteers I quite

agree with Admiral Arthur and those gentlemen who have spoken so well in their favour. I was connected with them many years ago, I think I may say I was almost the first who advocated the principle of the Naval Artillery Volunteers. I happened in my early half-pay days to be an Officer of a Cinque Ports battery of Artillery Volunteers, and we had our battery in a Cinque Ports brigade, whose services were supposed to be devoted entirely to manning guns to be carried in gun-boats for the protection of our coast. I believe that that was the origin of the Royal Naval Artillery Volunteers, as recommended by the Royal Commission of 1863, and I wish the present race of Royal Naval Artillery Volunteers every success.

Mr. COPEMAN: I want to be allowed one word to urge the extreme importance to this country of having torpedo-boats which can be used in rough weather. If we are relying on torpedo-boats as an important part of the defence of this country, it is imperative that they should be able to put to sea in all weathers, and I doubt whether we have any at the present time which could go out of harbour in rough weather.

Mr. TRELAWNEY SAUNDERS: I am unwilling that this subject should pass without calling attention to one very important branch of it. I particularly desire to show of what importance the Coast-guard stations might be made, especially with reference to attracting our rural population to the Naval Reserve service, in fact, to the defence of our shores on the sea, not on land, and in encouraging the natural disposition of our maritime population—the population, say, within 20 miles of the shore—towards nautical exercises. I think in that way every Coast-guard station should have its chance of showing the extent to which it might be made an active recruiting station, bringing more of the population of the country forward for the purpose of recruiting the Navy and mercantile marine, and especially for the purpose of defending our shores. I wish to get rid of the idea altogether of the Navy being looked to by Englishmen as an instrument of defence. I want to see it purely an instrument of offence. I would wish to see the regular troops take up the same position, purely as an instrument of offence, capable of being planted at any point on the shores of Europe where they may be wanted, through the instrumentality of a permanent transport service. In that way our small Army would become more threatening and more effective than the large armies we are familiar with on the Continent. To recur again to the question of the use which our Coast-guard stations ought to be for the defence of the country and the manning of the Navy, I cannot help thinking that we ought not to confine our movements with regard to Naval Reserves, Naval Volunteers, and so forth, to the great ports, but we ought to open any Coast-guard station that can influence the surrounding population, in the way of bringing them in as recruits, in the first place for naval defence, the defence of our shores, and in the next place for manning the Navy and the mercantile marine. I feel sure that the question deserves a more popular consideration than is the fashion of the present time. I doubt very much whether you will make the Naval Reserve to be a popular service, such as the military Volunteer Service has become, if you leave it entirely in the hands of naval Officers. I say that with the greatest respect for the naval profession, and for everybody belonging to it. I want to popularize the Service amongst our countrymen. I want to give an opening for every young Englishman, whether rustic or townsman, to become fit to serve his country in the Channel whenever his services may be called upon, and in order to do that you must give encouragement to all classes of our countrymen who are likely to be attracted in that direction; that is to say, there are some young men, tradesmen's sons, sons of gentry, and so forth, who would accept the mere opportunity of appearing in a gay uniform, and take the responsibilities belonging to that uniform, as you have in the military Volunteers, and that is a consideration that I have not heard ventilated in this discussion. I am sure there is an enormous field open to the development of our Coast-guard service, as an instrument for the defence of our shores on the waters of the sea, rather than, as was advocated on a previous occasion, allowing the enemy to land, which is an opinion that I am sure will be scouted by every Englishman. The true battle-field is the water, and that is where we must fight, and determine to succeed, and to succeed independently of the Navy. I hope your attention, and the attention of men qualified to deal with

this subject, and to make it tell upon the country, will be drawn to the capacity of the Coast-guard service and stations as instruments for attracting the rural and town populations towards the defence of the country, and the manning of the Army and Navy.

Colonel HOPE, U.C.: As Admiral Boys has led the way, I venture to say one word in support of his view, that the days of ironclads are beginning rather than ending; and I will quote Admiral Arthur's paper in support of that assertion, for when he contemplates the loss of the command of the Channel by the English fleet, and the invasion of this country, he instinctively supposes that the invading force is to be supported by an ironclad fleet. It seems to me, for in a certain sense these matters can be judged of even by a landsman, that the fleet must always have a backbone in the form of a rallying point composed of the largest possible armour-clad, and I think, instead of stopping at 10,000 or 12,000 tons, we ought rather to go forward to 20,000 or 30,000 tons. But no doubt the notion is a very general one, that the days of ironclads are over, and I think that is the reason why we should be very grateful to Admiral Boys for challenging that statement. However, Sir, an ironclad without guns is, no doubt, of very little use; and that brings me to that unfortunate occurrence of the other day. I am afraid our ironclads at present have no guns, and that would apply also to the suggestion of our friend from the north, who complains that our coast batteries have no larger guns than the old obsolete 40- and 64-pounders. The truth is *we have no guns in this country*. They are all rotten.

Admiral FREMANTLE: In endeavouring to reply I must ask your indulgence, because it is extremely difficult, as you will all naturally understand, to speak as two persons, and therefore I must speak rather in my own person, although with great regret that Admiral Arthur is not here to reply for himself, because no doubt several of the statements made by him which have been challenged he would have been prepared to defend, though I may let them go by the board because I do not see exactly how they are to be defended. Captain Mann mentioned several things in which I entirely agree. I certainly do think our Navy should be generally capable of taking the offensive, and if it is not strong enough it should be strong enough. That is touching upon the subject of the lecture we had here the other day from Major Elsdale, and I am I must say, as a sailor, very much more in sympathy with the sentiments in this lecture than I was with the lecture last Friday. As regards the number of first-class steamships required to convey 75,000 troops, stated by Admiral Arthur as 500, I must say when I read it, I thought it was an exaggerated statement. I have taken a little trouble to ascertain what the amount ought to be, and I should say roughly it would be more correct to put it down as 150 ships than as 500. Admiral Arthur may have very good reasons for that statement of 500; possibly he meant to take over provisions for all this large army, and therefore we must suppose, unless it is a misprint, that he had good reasons for saying so. It is one of those cases in which I very much regret that he is not here to speak for himself. As regards the Royal Naval Artillery Volunteers, as to whom a good deal has been said, both by Sir Robert Molyneux and Mr. Smith, I am sure it is not necessary for me to add much to what has been said by the lecturer. It is quite clear we are all in agreement upon that point. The general idea appears to be that they are ready to undertake any duties, that the more work they get the better, and I can only say I am sure Admiral Arthur will be extremely glad if he finds as the result of his paper, or possibly as a result of his paper, that general attention is directed to the services of this valuable corps, and the use that may be made of them, as no doubt we cannot expect them to be as useful as we should wish them to be if they do not have opportunities of perfecting themselves as they would wish to perfect themselves. Captain Curtis referred to the Naval Coast Volunteers of former days—some thirty years back—and he seems to think that a certain number of them were very efficient at that date. I am afraid the general impression amongst those who are old enough to have had any experience of them is, that at all events they would come under the definition of the "Sea Fencibles" in Nelson's time, to which Mr. Laughton alluded. I think they were scarcely as efficient as we could have wished. I am afraid they were rather the scum of the maritime population,

and therefore I can only think that there was some fault in their organization. At the same time one is very glad to hear that, bad as they were generally represented to be, in Captain Curtis's opinion even those men were of some use. I am quite aware Captain Curtis also alluded to the young boys, the fore and aft men; but I do not quite understand how he proposed that they should be brought into the Navy, or exactly how they could be made use of. If it can be done without any very great expense, I think we should all agree it would be a very useful thing to do. The cellular caisson proposed by Admiral Arthur, extending something like 12 feet from the ship's side, was criticized by Captain Curtis, and I think the effect of an explosion on that as affecting the stability was also criticized by Admiral Boys. It seems to me that that is a fair criticism. It was an idea thrown out by Admiral Arthur that some defence of this sort might be established, and certainly it has been proposed by others to have some defence of that sort: in fact I do not think it differs very much from what was proposed in principle at all events by Sir Edward Reed. I was very glad that Mr. Laughton referred to naval history, and to that little episode of 1760, because it does seem to me remarkably important. I am quite sure what Admiral Arthur was alluding to was simply this, that if we are to have a large force landed capable of taking the offensive in England, which he puts at the very moderate army of 75,000, the enemy must certainly have command of the sea for a considerable length of time. I do not understand him exactly if I read the paper aright as stating that it was impossible, under circumstances where they had not command of the sea, to make an isolated attack; in fact it seems to me to rather suppose that was the thing they would do.

MR. LAUGHTON: Allow me to explain. When I mentioned that episode of 1760, I was referring to something Captain Mann had said, in which he seemed to throw cold water on the necessity of defending our ports and harbours, which he thought should be defended by the seagoing Navy at a distance. I brought that forward as showing that at a time when our Navy was exceptionally strong, our ports were still liable to attack.

ADMIRAL FREMANTLE: I quite agree with what has been said by Mr. Laughton. My recollection is now that he was answering Captain Mann. I am very glad the question of British subjects has been referred to by Admiral Arthur and Mr. Laughton, and by Admiral Boys. Of course we shall be told we are interfering with the great principle of Free Trade, but we do not know much about Free Trade in this theatre, and we do not care very much perhaps about the Navigation Laws, but they exist, and we are infringing upon those principles when we talk on those subjects. But Admiral Boys' suggestion, at all events, I think does not infringe on Free Trade nor on the Navigation Laws, and it seems to me to be a very reasonable and fair one, namely, that the Government should give preference to lines which man their ships by Englishmen. At all events it seems to me that that is an invaluable suggestion. There was a reference to Hartlepool. I understand that Admiral Arthur was referring, in general terms of course, to most of our large shipbuilding and mercantile ports being up navigable rivers, and speaking generally this is the case, and on this subject we cannot help recollecting that it has always been our national policy to defend our great naval arsenals,—that our national policy, in modern times, at all events, is to build a very large proportion of not only our smaller vessels, but our ironclad fleet, by contract, and that places like the mouths of the Tyne and the Clyde are just as necessary, or very nearly as necessary, to be defended now as our great naval arsenals of Portsmouth and Plymouth. I am afraid I scarcely agree with the lecturer as to our ironclads, and I am more in agreement with what fell from Admiral Boys and a subsequent speaker upon that subject. I think I can a little convict Admiral Arthur out of his own paper. I hope it won't be thought I am behaving unfairly in doing so, but I must say when people talk about small torpedo-boats they do not speak always entirely by the card. Our small torpedo-boats used to cost about 8,000*l.* Mr. Copeman spoke of boats which he required to be reliable in rough weather, and Admiral Arthur has referred to boats as costing 25,000*l.*; therefore the boat is disappearing into the ironclad. It scarcely seems to be sufficiently considered what we are talking about when we are talking about a torpedo-boat. Of course you may call the "Polyphemus" a torpedo-boat, if you like, but other people

may call her an ironclad. I very much agree with Admiral Boys in thinking that an ironclad, or some large vessel, will and must exist, and that our torpedo-boats may be useful adjuncts to a fleet, but will never take the place of the big ships. With reference to recruiting in the Coast-guard stations, I have not the slightest doubt the Coast-guard stations might be made more use of in that respect than they have hitherto been. I think that is all I wish to say. I quite agree with everybody who has spoken, although I have taken a part once or twice in agreeing with the critics rather than with the author of the paper. I think this is an extremely valuable one, and there is one point which I have referred to, namely, the increasing use of the Royal Naval Artillery Volunteers, that I confidently hope will lead to some little fruit.

The CHAIRMAN: I will only detain you a few minutes before asking you to give your thanks to both Admiral Fremantle and Admiral Arthur. There is one point of importance connected with the defence of our coasts which was neither mentioned in the paper nor referred to by the speakers, and that is the necessity for the provision of fast and well-armed squadrons of ships constantly cruising at sea on every part of the coast of Great Britain and Ireland. With that object we must have harbours within easy reach, and I am of opinion that the great want that now exists for the efficient defence of our commerce and ports on the east coast of England is a suitable harbour of refuge in the vicinity of the Tyne, either at Filey, which offers conveniences for it, or at the mouth of the Tyne. There is not a port to which our squadron could go for coal or provisions, or for refuge in a strong easterly gale, on that part of the coast, and I think in a time of peace the Government could not spend their money better than by constructing a harbour of refuge in that vicinity. They will do even more for coast defence by such a work than by building small vessels for the defence of ports which ought to be provided as well. I cannot speak too strongly on the necessity for such a harbour. No one can speak more warmly of the Naval Volunteers, or appreciate their services, higher than I do. I have known them and been connected with them for years. We have much to thank them for, for having shown an example in giving up their time and money, and in putting themselves to great inconvenience, and enduring what probably would be to them hardships in the work they have volunteered to do. But with reference to a remark by Admiral Arthur, it is not a mere question of economy which has hitherto withheld a capitation grant from them, and that motion has never interfered with the grant. If the Naval Artillery Volunteers are to be extended to form the actual body from which we are to man our torpedo-boats and small vessels for the defence of our coasts and harbours, it is a necessity that it should be composed of seafaring men. Without disparagement to the present corps, it is a fact that not many of them are seafaring men, and therefore I think the Government have done wisely in hesitating to encourage them to extend their numbers, unless we can get seafaring men to join them. Everyone who knows the Naval Artillery Volunteers speaks well of them; it is highly creditable to them to have sacrificed so much solely with a patriotic object; but when you remember that we have about 10,000 first class Royal Naval Reserve seamen for manning our seagoing fleet, and also about 10,000 second class Royal Naval Reserve seafaring men, who have a capitation grant of 4*l.* to 6*l.* a year, and that this latter class are all men accustomed to the sea in steamers or sailing vessels or boats, fishermen, men from coasting vessels, and larger craft, all whom you may call seafaring men,—I think we ought to look about and make use of them for the defence of their own locality, or of the coast all round, as we are empowered to move them as is found necessary. If we can incorporate them with the Naval Artillery Volunteers, we shall then find our force for the purpose of manning torpedo-boats and the like. I think Sir Robert Molyneux mentioned that we ought to consider the difficulty we shall find in providing young Officers to command our torpedo-boats and other small vessels which will be required in time of war. I believe this is one of the most important questions that can occupy the attention of the Admiralty, the provision and the training of young Officers for the command of torpedo-boats and small vessels. What I understand Admiral Arthur to mean by his cellular construction at 12 feet distance from the ship's side is that it should be an outer skin, a cellular double bottom, 12 feet from the original hull. No doubt it

would be a very awkward thing, and, as he says, it will diminish the speed very much. I do not think we shall see that sort of apparatus built outside our ships. But he speaks of air space. Now there are three ways of occupying space for resisting a torpedo blow, one by air, one by water, and another by coal. I think we ought to press forward experiments to ascertain what effect coal will have in resisting the explosion of torpedoes; I imagine it would be far greater than is generally supposed, and much more than either air or water. One word with reference to foreign seamen. It is a matter on which I feel strongly. Admiral Arthur said that no ship should be allowed to go to sea unless the majority of its crew are British seamen. I happen now to be on a Royal Commission that is inquiring into the question of the loss of life at sea, and I can assure you ships rarely, if ever, go to sea with a *majority* of foreign seamen on board. We are so far safe, but that there is a large, a far too large, proportion of them there is no doubt. When we speak of Lascars, we must remember they are British subjects, and I do not think you ought to discourage the employment of Lascars in tropical climates. We ought to hope, though I am afraid we can do nothing more than hope, that the influx of foreign seamen will not increase. The fact is that foreigners, especially Scandinavians, are more amenable to duty than our own men are. You can depend upon their coming on board the day they are told, but it is not the case that they serve for less money; they have the same pay. Any movement that can be initiated or pressed forward to increase the numbers and improve the quality of our seamen, and thus prevent the influx of this foreign element in our merchant ships, would be a very great blessing to this country. I will now ask you to give your thanks to Admiral Fremantle, and will request him to convey your thanks also to Admiral Arthur for his interesting paper, and regret for the cause of his absence.

Wednesday, June 2, 1886.

GENERAL THE RIGHT HON. VISCOUNT WOLSELEY, K.P., G.C.B.,
&c., &c., &c., in the Chair.

MOUNTED INFANTRY.

By Major E. T. H. HUTTON, King's Royal Rifles (late Commanding
Mounted Infantry in Egypt).

"Come the three corners of the world in arms
And we shall shock them: naught shall make us rue,
If England to herself do rest but true."

Introductory.—In bringing this much discussed question of mounted infantry before the military public, I trust that the fact of my having presumed to do so may not be misconstrued.

This question has been much talked of, and so much has been written and spoken, both in England and on the Continent, upon the subject by civilians and others more or less conversant with it, that it has been deemed a fitting time for putting the matter before the professional public in this hall with a view more especially of inviting that discussion and free criticism from the many experienced and distinguished Officers present, which its importance and interest merit.

Of the general utility of Mounted Infantry and of the excellent service performed on all occasions by them, there can be but one opinion—but there *is* a difference of opinion as to the necessity for such a force, and also as to its mode of organization should such a necessity be conceded.

It is therefore with regard to these two points that I would more especially invite your attention.

A. THE OBJECT OF MOUNTED INFANTRY.

1. *To provide an improvised Substitute for an expensive Cavalry in small and hastily organized Expeditions.*

All military expeditions—no matter how small and insignificant the number of troops employed—must be accompanied by a proportion of mounted men; and whether you call them cavalry, mounted infantry, or irregulars, the functions to be performed by them are the same. In our recent small campaigns, the only occasions when mounted men were not and could not be used were in the Red River Expedition of 1870 and in the Ashanti War of 1873-74. In the case of the Red River Expedition, the column being conducted throughout by water, no means existed for supplementing the force so despatched by any mounted troops for scouting purposes. Again,

in the Ashanti Campaign the bush was so dense that no draught animals, or beasts of burden even could find their way through, so that the scouting and legitimate work of mounted troops had necessarily to be performed, as best it could, by native irregulars.

We have in India a magnificent force of irregular cavalry; it is therefore mainly in our expeditions sent elsewhere that the legitimate cavalry work has to be arranged for, and where any available means on the spot have necessarily to be utilized for that purpose.

Our recent wars and expeditions have repeatedly warned us how helpless infantry must be when acting aloae. A few mounted men would have prevented the surprise and disaster on the Intombi River in 1879. A few dozen mounted men, as scouts, who understood their duties, would have averted the catastrophe at Bruncker's Spruit in 1881, and with that the loss of our military prestige in South Africa and all its fatal results.

Later in the same campaign a force of mounted men properly equipped and carefully trained would in all human probability have saved our arms from defeat at Lang's Nek and the Ingogo River. At Lang's Nek, by occupying the fatal kopje from which some thirty or forty mounted Boers poured in a destructive flanking fire upon the advancing column of the 58th; and at the Ingogo fight by first of all ascertaining exactly the position and force of the Boers opposed to our small column, and subsequently during the engagement by preventing the Boer horsemen from enveloping both our flanks and enclosing our little force in an almost complete zone of fire.

There was indeed a small makeshift force of mounted men used at Lang's Nek, but they had been so hastily equipped, and were so completely untrained, that many fell from their horses in riding up the slope of the position, and it was said at the time that to place such men in opposition to the Boers, was to court disaster.

In 1882, upon the arrival of our advanced troops at Alexandria, the first orders issued by Sir Archibald Alison were for the organization of some mounted infantry, and the importance of the work they performed, our comrades of the Navy and Marines were the first to gratefully acknowledge.

Instances such as I have quoted can be amplified *ad libitum* by those present whose experience is much more extended than mine. The fact which I wish to press upon your attention is, that to have available in all infantry battalions a small supply of men who can be used for such purposes as scouting and reconnoitring, is absolutely essential to the success of all our small expeditions.

Our cavalry cannot be counted upon for such purposes—their number is too limited to admit of their being frittered away in every quarter of the globe where we have troops stationed.

After the Zulu and Boer campaigns this principle was temporarily conceded in South Africa—and one company per infantry battalion was mounted.

It is by no means necessary that even abroad a certain proportion of men should be mounted permanently, but it is essential that there should be available in the ranks of every infantry battalion a small

nucleus of Officers, non-commissioned officers, and men, who in an emergency could be mounted, and made at once, when occasion arises, into a corps of mounted men.

Such men might be employed for the regimental transport in a European war.

It is not fair to suppose it possible that infantry soldiers can be equipped and given horses one day, and be told to engage an active enemy the next. It was a favourite saying of Lord Clyde that if "you put men in a false position, the best will misbehave." It is not, recollect, the training of the men only which is so much the difficulty as the ignorance on the part of all concerned, Officers and men, of everything connected with the interior economy and management of horses upon a rough and ready scale.

Efficiency in a mounted force consists in the existence of a sound system of interior economy and stable management.

My critics will argue no doubt that on all expeditions a proportion of cavalry to the infantry detailed should be employed for the work which I would have carried out by mounted infantry, to which I reply that we have neither the cavalry soldiers nor horses to so employ. If we are to have in our cavalry an establishment of men and horses which would make that force adequate for the purpose of all minor expeditions, we must be prepared to double the expenditure upon that arm.

Allow me to give a rough estimate of the respective expenses of cavalry and mounted infantry as placed in the field at Suakin in March, 1885.

(a.) 4 Squadrons of cavalry, say 24 Officers, 400 men, and 400 horses.

(b.) Mounted Infantry 2nd Battalion, in round numbers say—

24 Officers	48 horses	} = 448
400 non-commissioned officers and men	400 „	
(a.) 400 cavalry horses at £70		£28,000
A cavalry horse purchased as a		} = £70
3 year old.....	£40	
2 years keep at £15 per annum....	£30	
	Total	£28,000

(b.) 448 mounted infantry, Arab ponies purchased in	
Egypt at £26 each	£11,648
Mounted Infantry soldiers, extra clothing 400 at	
50s.....	£1,000

Pay same in both cases.	£12,648
Equipment and horse furniture, &c.	

Our German critics ask cynically, Why do you create a hybrid of hasty and therefore doubtful organization, when you have already cavalry and infantry? Why make infantry do cavalry work?

To which queries we, with the experience of small wars conducted at 5,000 and 7,000 miles away from England, reply that our Army being so small—the men composing it must be prepared to perform duties of

a varied nature as emergencies demand. In North America we have to march in snow-shoes or portage boats, in South Africa we must swim rivers, drive ox wagons, and ride half-broken horses. In India and in Egypt we have to march over trackless deserts under the fiery rays of a tropical sun, to ride camels, to row and portage boats up well-nigh impracticable cataracts.

In each and every country our Army has to adapt its tactics to its foes. No German critic seems to recognize that the requirements of our Service necessitate something beyond the stereotyped rules of war. The work required by British soldiers, aye and sailors too, is as varied as the climates under which they serve.

2. To provide for a Campaign on a large scale an efficient Auxiliary to our Cavalry.

It is, I imagine, an open secret that arrangements were under consideration last spring for placing two Army Corps of British troops, or 60,000 men, in the field, presumably to operate in Asia Minor. The proportion of cavalry required would be 10,000 or eighteen regiments.

There were at the time I allude to seventeen regiments of cavalry upon home service, of which at least four would necessarily have to be retained at home in addition to the dépôts. Thus May, 1885:—

	Officers.	All ranks.	Horses.
England. Household cavalry, 3 regiments	70	1,196	838
Line regiments, 8 "	177	4,357	2,729
Scotland, " 1 "	21	472	297
Ireland, " 5 "	114	2,699	1,667
Total.....	382	8,724	5,531
1st Class Army Reserve (B and C) .....	..	1,861	
Grand total	382	10,585	5,531
Deduct horses, ¹ 30 per cent. for 3- and 4-year old and worn out horses .....	..	..	1,651
Total available.....	382	10,585	3,881
War establishment of 17 regiments of cavalry, inclusive of dépôts. Total....	476	10,211	6,800
Wanting to complete	94	..	2,911
In excess .....	..	374	
From the above totals deduct the dépôts of 13 regiments ordered for service, and the total establishment of the four regiments remaining at home	130	4,042	
Leaving to be made up by an improvised force to complete 10,000 mounted men.	170	3,831	3,000

¹ Estimate of Colonel Keith Fraser, and quoted by Colonel Russell in his recent lecture.

It is thus to supply the deficiency above pointed out that we should require an improvised force of mounted infantry.

Two or three battalions of picked infantry mounted on Syrian horses or Karamanian ponies would be able to relieve the cavalry of many of their most trying and irksome duties—such as vidette and outpost work—orderly duty, and escort. It should then be possible to save the big English horses of our cavalry much of the exposure and hard wearying work which in a tropical and uncongenial climate so soon destroys their efficiency as a tactical unit on the field of battle.

An infantry soldier mounted on a country-bred rough pony is equally if not more at home on outpost duty in a close and difficult country than is his comrade of the cavalry, booted, spurred, and heavily accoutred. Relieved thus of many of their most trying duties, our numerically weak cavalry would be in a position to undertake reconnaissances and raids on an extended scale, and to be always ready and in hand to engage the masses of an enemy's cavalry.

Our cavalry may be said to be inexpansive, and to maintain the thirteen cavalry regiments up to their strength for a campaign would engage all the resources and energy of the dépôts and regiments on home service.

A cavalry soldier must be well trained as such before he is of any use, and the horse no less than the man. Such training requires time, at least eighteen months most cavalry authorities state.

With mounted infantry this is not so. Given experienced Officers, a sprinkling of non-commissioned officers and men, who have had some previous knowledge, a sufficient training can be given in a very short space of time to enable men to ride for all practical purposes of mounted infantry.

Bear in mind that a mounted infantry soldier is merely a selected infantry man with the increased power of locomotion which a horse, pony, mule, or camel may give him. The great difficulty is to obtain the requisite number of experienced or trained Officers, non-commissioned officers, and men to knead the remainder into shape, and unless such are forthcoming when occasion requires, the most serious delay must necessarily follow in placing such a force in the field.

I would add here some remarks upon the principles of training required for mounted infantry. I have always found that Officers and men upon first joining appeared to think that the drill, steadiness, and even discipline of an infantry soldier were to be exchanged for an irregular, slap-dash, helter-skelter method of manœuvring and doing their duty. It is this idea which is the most difficult to combat. It has to be most strongly impressed on all that it is the extreme steadiness and most complete discipline which alone can make mounted infantry useful in the numerous critical situations in which they are called upon to act.

While upon this subject I would earnestly press upon the military public the paramount importance of the very strictest attention being paid to the details of drill, and the minutiae of the interior economy in everything which affects the soldier. Indeed, gentlemen, it is in

the closest adherence to routine, to rules, and to orders definitely laid down upon which we must base the foundation of true discipline. It is the tendency of the present day, by the increase of education, the increase of political freedom, to place all men on an equality, and if it be our sole object to raise the moral power of men generally, no other or better effect could be wished for, but beware how this feeling spreads itself among the ranks of the Army in a manner tending to snap the cords of discipline.

I fear that there is creeping into our Army the feeling that strict unthinking obedience, and the careful adherence to the smallest details of drill or duty, are no longer required of a soldier educated in the more scientific lines of a modern soldier's career. That extreme steadiness on parade (the pride of British infantry)—that complete control under fire—that unflinching coolness in moments of danger, which are the outcome of a mechanical discipline alone acquired in time of peace during the monotonous days of barrack life, are becoming more and more rare. Do not let us delude ourselves upon this point.

Obedience, submission, discipline, courage—these are the characteristics which make a man; they are also those which make the true soldier. Out of this it is only soldiers' discipline which can bring the full force and power, and it is discipline which at once calls out and directs their energies.

I am prompted to make these remarks, because I feel that I am expressing the opinion of those more competent to judge than myself, that the result of the loose formations necessitated by the accuracy of modern firearms, and the increased rapidity with which tactical manœuvres on a field of battle must necessarily be executed, have been to destroy in a very serious degree that steadiness and solidity of our troops in action, and to have reduced to an alarming degree the cool and deliberate execution of orders in moments of danger and excitement. Those of my hearers who have taken part in the recent campaigns will undoubtedly corroborate my assertion that our "fire discipline" is most defective. Consider, further, the haphazard and irregular manner in which the Attack Formation is practised—the formation which of all others requires extreme steadiness and cool precision.

Discipline, and true discipline, is more closely allied to the careful attention to the number of inches to a pace, or to the length of a strap, or the position of a buckle, than unthinking men will perhaps allow.

Moral discipline, or the power of a strong will over a weaker, is what we pray for, but the qualities that produce it are not common. I may almost say they are rare! Nothing then in their absence remains but mechanical discipline, and it is that which I would impress upon you as being of such paramount importance.

Mechanical discipline it is, grafted upon the strong individuality of the Anglo-Saxon, that has given British infantry the character of being the finest in the world. Let us maintain our birthright!

3. *To provide a Force of Selected Infantry sufficiently mobile to act as such in conjunction with Cavalry.*

Jomini, the well-known commentator upon the great military feats of the commencement of this century, tells us in his "L'Art de la Guerre," "It is certainly an advantage to have several battalions of mounted infantry who can anticipate an enemy at a defile, cover a retreat, or scour a wood."

We know that Napoleon the Great specially raised and equipped his dragoons for that very purpose; but that they lost their characteristics as cavalry almost immediately, is also well known.

No one who, even at Aldershot, has seen the dismounted dragoon or hussar struggling with clanking sword or jingling spur, encumbered with long boots, and crowned with an impossible though showy head-dress, can doubt for a minute what the result of a skirmish in a defile or a struggle in a wood would be when such were called upon to encounter an active and self-reliant body of infantry marksmen.

The arms in the hands of a cavalry soldier would place him at a sad disadvantage on foot in an encounter with an infantry man; the carbine and sword is no match for the rifle and bayonet.

I venture to submit that as a certain proportion of artillery is considered indispensable for the effective support of cavalry, so also is a proportion of carefully selected and mobile infantry necessary. The enormous power and increase of range in infantry fire must necessitate the employment of infantry to protect and cover the movements of cavalry from an enemy's infantry, and I feel sure that such will be found the case in the next campaign between civilized Powers.

The great consensus of opinion points to the fact that cavalry cannot be used effectively as infantry.

Rogniat, in his "Considérations sur l'Art de la Guerre," published at the close of Napoleon's great campaigns, says: "It is impossible to train the same man to consider himself invulnerable against cavalry when on foot, and alike irresistible when mounted. For that reason the dragoons are despised alike by infantry and cavalry."

General Rosser, of the American Army, stated at the conclusion of the War of Secession: "The cavalry soldier should never be dismounted to fight if you expect him to ride over masses of infantry, and he should be educated to believe that nothing can withstand a well-executed charge of cavalry."

One of our own best known authorities upon cavalry writes: "Cavalry must be armed with firearms, but if used as infantry they will very soon lose faith in the sword and lance, and become quite useless as cavalry. You will never get such to accomplish what was done at Balaklava or at Rezonville."

B. THE ORGANIZATION OF MOUNTED INFANTRY.

1. *The best System for improvising an Efficient Force of Mounted Infantry, having due regard to Expense and the Means at our Disposal.*

The system by which that part of the Mounted Infantry Camel Regiment furnished from battalions at home was raised is, I consider, by far the best. It is undoubtedly the most satisfactory and the most popular among Officers and men, while at the same time it leaves the regiments on the theatre of operations intact.

It was briefly this: Certain infantry battalions were selected, and their Commanding Officers were communicated with, and requested to detail a detachment complete for service in the Soudan of 1 Officer, 1 sergeant, 1 corporal, and 25 privates. In some cases a particular Officer was asked for, provided there was no regimental objection.

The detachment thus composed formed one of the four divisions of the mounted infantry company, and remained intact in the corps, forming a small unit representative of the regiment to which it belonged.

This system has the advantage of promoting great *esprit de corps* and emulation among the men, while Commanding Officers of the regiments furnishing the detachments take the greatest pains to select only non-commissioned officers and men in whose hands they feel that the honour of their regiment will be safe. Indeed the Commandant of a corps composed of detachments thus selected has little to fear; he may rest assured that, come what may, the men will acquit themselves as a *corps d'élite*. This plan has proved most popular.

The principle of taking detachments from regiments on service for this duty should never if possible be resorted to. You extract, in doing so, from each company in an infantry battalion the four or five best soldiers and leading spirits, men whose example and moral influence among the many young soldiers of our battalions is simply invaluable. Such a principle is vicious in the extreme, and one against which every good Commanding Officer kicks.

Again, to form a corps by calling for volunteers from infantry and cavalry regiments, as was done in forming the mounted infantry for service in South Africa during the Boer War of 1881, is unsatisfactory in the extreme. As a rule the waifs and strays of regiments volunteer, and to create an *esprit de corps*, and to obtain any degree of efficiency in a regiment so formed, is a long and serious undertaking. It was entirely due to the great power of organization, tact, and intimate knowledge of his profession possessed by its Commanding Officer, the late deeply-lamented Colonel Percy Barrow, that this corps was placed in the field in the rapid manner that it was. Such men, alas, are rare! and the Army has lost by the early death of this distinguished Officer one of the very few men who combined the power of organization with the all-important gift of leading men. After Colonel Carrington, of South African renown, Colonel Percy Barrow may be said to be the father of the present system of mounted

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MOUNTED INFANTRY SOLDIER.
2nd Battalion Mounted Infantry
as equipped and Mounted for Service at Suakim, March 1885.

infantry, and the views that I have endeavoured to lay before you this afternoon were fully shared by him.

The best manner undoubtedly of improvising a corps of mounted infantry for a campaign is to form it by detachments complete from those battalions which are the least likely to be required for service. I shall refer later on to this system, and how it may be advantageously applied to the formation of a volunteer brigade of mounted infantry.

With regard to the arms and equipment for mounted infantry, I very strongly urge the necessity of some additional weapon to the rifle and bayonet—some weapon which will enable a man to defend himself when mounted, acting, for example, as a scout. A revolver, or still better a double-barrelled pistol, would best answer this requirement.

In 1882 every fourth man received a revolver, which was supplied by the Navy. A cavalry sabre, which has been at times issued to mounted infantry, is a useless incumbrance, as to wield a sabre requires ability as a horseman, steadiness on the part of the horse, and knowledge of the weapon quite beyond the capabilities of an infantry soldier or the power of his beast.

I trust that the days of the sword-bayonet are numbered, and that a weapon which has positively no recommendation but that it *may* be used to cut down small brushwood, will soon cease to be an authorized sidearm for the unfortunate soldier who has to trust in it. It is heavy, it is cumbersome, and it is useless to cut or to thrust with; if used in the latter capacity it cannot be disengaged, and it then almost invariably either jams the foresight of the rifle or damages the spring.

2. *The Necessity for some previous Training, and a General System of Organization for Mounted Infantry.*

If, therefore, it be conceded that mounted infantry are necessary, either as an adjunct to or as an auxiliary to our insufficient cavalry, we should be prepared to adopt some system which would give both Officers and men of infantry regiments the necessary training.

This object might be best and most readily obtained by a school and cadre corps of mounted infantry to be established at Aldershot. To this might be sent small detachments complete of 1 Officer, 1 sergeant, 1 corporal, and 25 privates from certain specified infantry regiments, those probably which are the first for foreign service, and are in the highest establishment. The men would go through a three months' training in the duties of mounted infantry, and for the last fourteen days might be further put through a short course to teach them the essentials of the work connected with wheel and pack transport, *i.e.*, driving wagons and how to load and unload pack animals, and other details. Two such detachments should be trained before any infantry battalion went on foreign service, so that there would be available 2 Officers and 54 non-commissioned officers and men for any mounted work necessary.

A complete roll of the Officers and non-commissioned officers and men so trained would be kept at the school, specifying the proficiency

of each, so that in case of war or necessity arising, it would be comparatively easy to obtain the staff necessary for raising any force of mounted troops. I more particularly allude to this in my volunteer scheme for a national emergency treated on later.

The school itself, consisting of a limited number of Officers and instructors, would be the nucleus upon which a large corps could be embodied.

The training might be carried on by utilizing cast horses from the cavalry. A scheme embodying the principles I have suggested was prepared two years ago, and is in the hands of the authorities, by which it was shown that for 5,113*l.* per annum, including the cost of forage and all expenditure, 12 Officers and 300 non-commissioned officers and men could be put through such a training annually; not a very high price to pay for an efficient auxiliary to our cavalry!

Some volunteer battalions have recently followed the instinctive want for a larger proportion of mounted men, and have added mounted infantry companies to their establishment. This move is most popular, and has been surprisingly successful. The authorities are now, I understand, encouraging the movement. This is a wise course enough; but if any real degree of efficiency is to be maintained by these isolated mounted infantry companies, instructors must be provided, and the men themselves taught on one recognized system, both of drill and interior economy.

To ensure this, a school as I have described above must be provided, and the want of some place where Officers, non-commissioned officers, and men can be taught the very simple principles of a mounted infantry man's work, is keenly felt by those enterprising Commanding Officers who have originated the movement.

If the present incipient movement continues, but is not conducted upon some recognized mounted infantry lines, the mounted companies will very speedily become a species of yeomanry, that is, will exchange their infantry characteristics for those of light horsemen.

This would be to destroy the *raison d'être* of such a force.

3. *The Objections to a Permanent Corps.*

Some military authorities have advocated a permanent corps of mounted infantry. I venture to submit that this would entirely defeat its own object. Organized during peace, and acting with cavalry, it would be impossible to prevent such a force becoming a very indifferent cavalry. An infantry soldier would, under these circumstances, soon lose his identity as such, the temptations to become a cavalry soldier would prove too strong. There is no reason to suppose other than that a corps of mounted infantry permanently organized would share the same fate as the dragoons of Napoleon the Great, and would gradually abandon the less attractive rôle of their duty as infantry for the more dashing one of the traditional "bold dragoon."

Then, again, to raise a corps of mounted infantry is to add the expenses of an extra cavalry regiment to the Budget, and the already

groaning taxpayer would hardly be content to endorse such a step unless for very strong reasons, which it appears to me would be difficult to give.

C. VOLUNTEER FORCES MOUNTED INFANTRY.

The extraordinary disproportion between the mounted branch and the infantry branch of the Volunteer Forces has been so often pointed out, and is so universally admitted, that any effort to obviate the difficulty should be met by every possible encouragement.

To quote the statistics last year :—

Militia infantry	102,822
Rifle volunteer infantry	173,047
Total	275,869
Yeomanry cavalry, present training, 1885..	9,779
Light horse volunteers	292
Mounted rifles	40
Total	10,111

N.B.—Yeomanry enrolled, 11,590.

I have, I think, shown very conclusively how inadequate is our force of mounted troops, and how pressing would be the necessity of augmenting their number in case we had to put forth our greatest military strength, and embark in a campaign upon some theatre of war beyond our own shores.

With this difficulty in view the following plan was drawn up in March, 1885, was submitted to, and highly approved of by the highest military authorities.

A Scheme for raising a Brigade of Mounted Infantry Volunteers (four battalions for immediate Service in the Field wherever required).

The great consideration which must influence any scheme for the sudden expansion of Her Majesty's disposable forces for service in the field would be how the latent military power and soldierly qualities of the Volunteer Force might best be utilized.

We have in our volunteer regiments of England and Scotland the very material which, properly equipped, and with but very little training, would make the most effective and brilliant description of mounted infantry imaginable.

Taking into consideration the military spirit of the nation, and of the Volunteer Force in particular, there would be no difficulty in obtaining from certain selected battalions of the volunteers sufficient men who would be both anxious and willing to serve wherever required in case of an emergency arising.

Each battalion so selected would contribute a small detachment complete in Officers, non-commissioned officers, and men, and form a

division in each mounted infantry company. Each of the four divisions which compose a company would remain intact, and represent the corps to which it belonged, the company in its turn representing the volunteer battalions of a particular county.

Conditions of Service.—Volunteers enrolled thus should be paid at cavalry rates, and every expense of equipment, rations, and horses should be borne by the public. A bounty would be given the men upon enrolment, and a farther lump sum paid at the termination of their service.

The following should be the conditions of service:—

(a.) Enrolment to be voluntary.

(b.) Candidates must have at least two years' service as "efficients" in the Volunteer Force, and must have qualified as first class shots or marksmen in two distinct courses of musketry.

(c.) Candidates must be recommended by the Officers commanding their companies and battalions as being suitable for the duty of mounted infantry, and as being likely from their good conduct and intelligence to bring credit upon the corps to which they belong.

(d.) It is desirable that preference should be given to men who can ride, or who have some knowledge of horses.

(e.) *Age.*—Not to exceed thirty years, nor to be less than twenty-one.

Height.—Not less than 5 feet 6 inches, and 36 inches round the chest.

Physique.—To be of hardy physique, and each candidate must have a doctor's certificate pronouncing him fit for service in any climate.

The enrolment should be for six months, renewable at the option of the Secretary of State for War for twelve months, for service wherever required.

(f.) The Secretary of State for War to have the power of disbanding the battalions at any time upon giving one month's notice or one month's pay in lieu of such warning. The Secretary of State for War will have the power of dispensing with the services of any individual at any time, either on account of misconduct or unsuitability.

(g.) A complete mounted infantry soldier's kit, including necessities as per accompanying Appendix marked I, will be issued to each man on joining.

Horses.—The battalions thus enrolled should be mounted on Hungarian or Syrian horses. The latter are most strongly recommended, because they are small, compact, and very hardy.

Place of Assembly.—It would be advisable to assemble the companies and battalions at Aldershot, where they would receive their equipment, and where their instruction might be at once begun; horses cast from the cavalry being used for the purpose.

Time required.—Given the horses, and competent Officers, with the personnel suggested in the accompanying schedule, a fortnight would be sufficient time to have a brigade thus constituted in a sufficient state of efficiency to take the field.

Under the present conditions it would be most difficult to find Officers even, and much more non-commissioned officers of the

regular Army, who would be competent to do justice to this force, though there are doubtless many first-rate Officers and non-commissioned officers who could and would be forthcoming. If this mounted infantry school were organized as suggested, the difficulty would be at once solved, and from the list existing in the school there would be no hitch in providing a fair proportion of the Officers and non-commissioned officers required, who had had the requisite training.

Organization. Division.—Each detachment from a volunteer battalion composes one out of the four divisions which make up the mounted infantry company as per M.I. Regulations issued with G.O. 1 of 1884.

The division consists of :—

- 1 Officer (Subaltern or Captain).
- 1 Sergeant.
- 1 Corporal.
- 25 Privates (exclusive of Officers' servants).
- 1 Bugler. This for every two divisions.

Company.—The company should be commanded by a Major or Captain of the regular Army selected for his special qualifications by H.R.H. the Commander-in-Chief.

The company to be thus composed :—

- | | | |
|--------------------------------|---|--------------------------|
| 1 Captain or Major | } | From the regular forces. |
| 1 Company sergeant-major | | |
| 1 Farrier | | |
| 2 Shoeing smiths | | |
| 2 Saddlers | | |
| 1 Riding instructor (sergeant) | | |

with four divisions, viz., 4 Officers, 108 non-commissioned officers and men.

Battalion.—Each battalion should consist of four companies. There should be a Commanding Officer and second in command. The battalion staff to be as follows :—

- | | | |
|--------------------------|---|--------------------------|
| 1 Commanding Officer | } | From the regular forces. |
| 1 Second in command | | |
| 1 Adjutant | | |
| 1 Quartermaster | | |
| 1 Medical Officer | | |
| 1 Veterinary Surgeon | | |
| 1 Sergeant-major | | |
| 1 Quartermaster Sergeant | | |
| 1 Paymaster Sergeant | | |
| 1 Orderly-room clerk | | |

Brigade.—The brigade should be composed of four battalions. The staff required would be as follows :—

1 Colonel of the Staff	}	From the regular forces.
1 Orderly Officer		
1 Staff Officer		
1 Paymaster		
1 Military Staff Clerk		
1 Assistant Staff Clerk		
1 Paymaster's Clerk	}	

Note.—In the accompanying suggested plan, those counties have been selected to furnish detachments which have the largest number of volunteer battalions : and those volunteer battalions in each county have been detailed which show the largest number of Officers available in proportion to their establishments.

Attached is also a form, marked Appendix III, showing the establishment of each division, battalion, and of the brigade, including that of the horses, upon the lines laid down in Mounted Infantry Regulations.

2. *Proposals for Officering a Force so Raised.*

I acknowledge that to find Officers of volunteer corps suitable to command the detachments furnished by their corps might be a difficulty. It is most desirable that each detachment should be representative of its own battalion, but if no Officer is to be found who is willing or who is suitable to undertake such a duty, it should then lie with the Officer commanding the regimental district to recommend an Officer from the yeomanry or even militia of the county to join and assume command, should he be otherwise qualified.

It is of the utmost importance that the Officer should if possible belong, if not to the corps providing the detachment, at least to the county with whose title the company would be associated.

3. *Remarks upon the Yeomanry.*

It is to be hoped that the movement which some of the leading Volunteer Commanding Officers, like Lord Mount Edgcumbe, Lord Wantage, and others, have initiated in their regiments, the 5th Devon, the 1st Berks, &c., may be speedily developed on a large scale. There is also a very growing opinion that the yeomanry should become mounted rifles, and I cannot but think that the grant of 80,000*l.* per annum would be much more beneficially spent if devoted to their training as mounted infantry, than to the present vain attempt of making an efficient cavalry in six days' training per annum. The work and duties of mounted riflemen are those most thoroughly congenial to the sporting instincts of English and Scotch yeomen farmers, or that class of individuals which you especially wish to attract into the ranks of the yeomanry and volunteer service.

You would thus possess mounted battalions of men accustomed to horses and trained as riflemen, who would be useful and efficient,

in place of half-trained men upon horses untrained to be ridden in the ranks, from whom, man and horse, it is alike unreasonable to expect any high degree of efficiency as cavalry.

Again, England is ill adapted to the movements of cavalry, in fact except in some isolated districts the country is so cramped and intersected by enclosures and woods that the movements of cavalry as such would be necessarily confined to the lanes, roads, and commons, where a few well-placed mounted infantry would be more than a match for the most dashing squadron of cavalry.

This radical change in the character of the yeomanry would, I am convinced, be not only eventually popular with the class from which it is recruited, but the country generally would feel that it had at its disposal a practically useful and valuable body of horsemen, and that the advantages of the yeomanry were something more than nominal.

D. REMOUNTS IN TIME OF WAR FOR IMPROVISED MOUNTED TROOPS.

In conclusion, I beg to offer a table, Appendix IV, showing the number of horses available for the purpose of mounting an improvised corps, and to be obtained at short notice from Arabia, Syria, and Asia Minor.

The information it contains is the result of personal investigations during the time that I was President of the Remount Committee in Egypt.

The remount question has been most ably treated by Colonel Frank Russell from the cavalry remount point of view.¹ The class of horse with which my table deals is one suited to mounted infantry or to irregular cavalry, rather than to cavalry who are expected to act as a formed body on the field of battle, and whose weight must necessarily be sufficient to ride down an enemy's cavalry or broken infantry.

The question of horse supply is one of the greatest importance, and I have therefore ventured to supplement my paper by some information on the subject which may contribute to allay the anxiety generally felt as to the extreme difficulty of obtaining the number of animals requisite for our wants in a national emergency.

I may add that all horses purchased in Syria or Asia Minor are sufficiently broken for practical purposes—indeed, when raising a battalion of mounted infantry in Egypt in the spring of 1885, horses were bought in the open market one day, and ridden by untrained mounted infantry soldiers in the ranks the next, no mean test. Average height, 14.1; average price, 26*l.*; age from five upwards.

These horses did most admirably in and about Suakin last year, and their powers of endurance astonished everyone. It was precisely this description of horse which the late Colonel Percy Barrow had for his detachment of the 19th Hussars, when accompanying Sir Herbert Stewart's column across the desert. Upon one occasion he mentions that his horses were fifty-two hours without water.

It was, I believe, suggested at Colonel Russell's lecture, that

¹ See Journal, vol. xxix, No. CXXXII, p. 1015, *et seq.*

Canada will be the country to which we should look for remounts for our cavalry, and Lord Melgund, who at that time had only just returned from Sir F. Middleton's short but brilliant campaign in the Far West, especially drew the attention of the audience to the excellent class of horse to be procured from the ranches of North America.

Horses are bred in great numbers, as is well known, upon the distant prairies of North America, and I am informed, upon the best authority, that a very large number of horses can be purchased on the slopes of the Rocky Mountains for an average price of 20*l.*, over 15.2 in height, and from five to seven years old. It is estimated that these horses could be landed in England at an average cost of 10*l.*, making the total price for each approximately 30*l.*

Considering the enormous price now paid for our cavalry horses, estimated as I have shown at 70*l.* each by the time they are five years old, it may well be a matter of interest to inquire whether a remount agency established at some point upon the Canadian Pacific Railway would not be a satisfactory solution of what is fast becoming a very pressing and urgent question.

It is well known that live stock in great and still increasing numbers are imported from America, and I submit as a suggestion to those more competent to judge, whether some such plan might not prove better and more economical than the present one by which our cavalry Commanding Officers are bidding against one another, through dealers in the open market, for horses which, when purchased, have to be kept until they are sufficiently matured to take their places in the ranks.

I trust that I may be excused for offering these few remarks upon the remount question, with which Colonel F. Russell has so ably dealt, but the question of mounted infantry or the improvisation of a force of mounted men, is one which must be considered together with the question of whence their beasts are to be procured, and I hope that it will not be supposed that I have thereby wandered from my subject.

Gentlemen, in conclusion, I must thank you for a patient and considerate hearing. I feel that I have not done justice to the very important subject upon which I have endeavoured to invite your attention.

My principal motive in addressing you this afternoon has been to show how inadequate is the proportion of mounted troops to the infantry which it is in our power to place in the field, should occasion demand it. With this object in view, I have endeavoured to demonstrate how an impromptu force of mounted men, whether composed of regulars or of volunteers, could be raised, and could be most effectively placed in the field at short notice to meet this deficiency.

I trust that some of the distinguished Officers present will add their more matured opinions upon the questions which have been raised, and allow me in conclusion with the poet to add—

“For still we hope
That in a world of larger scope,
What here is faithfully begun,
Will be completed not undone.”

APPENDIX I.

MOUNTED INFANTRY.

The following articles of equipment, necessaries, and saddlery are required to be in possession of every mounted infantry soldier, and will be carried as follows:—

1. *On Person.*

Helmet	1 guernsey	rifle and sight-protector
1 flannel shirt	1 kharkee coat	bayonet and scabbard
1 " belt	1 water-bottle	waist-belt
1 pair drawers	1 haversack	side pouch
1 " socks	1 knife and lanyard	70 rounds ammunition
1 " pantaloons	1 oil-bottle	revolver and case, and
1 " putties	1 bandolier	12 rounds of ammunition
1 " boots	back pads (tropics only)	in haversack.
1 " spurs	curtain to helmet (tropics only)	

2. *On the Horse.**Off Wallet.*

1 shirt
1 towel
1 piece of soap
10 rounds ammunition
knife, fork, and spoon
tobacco

Near Wallet.

brush polishing
curry-comb
rubber and sponge
box of grease
10 rounds ammunition
cleaning things
1 pair socks
1 forage cap.

3. *In Cleaning Bag.*¹

1 pair trousers	1 pair drawers
1 " socks	housewife
1 " boots	hold-all.

4. *In Kit Bag.*

1 kharkee coat	1 flannel shirt
1 pair trousers	1 " belt
1 " boots	1 towel.

Saddlery.

Every mounted infantry soldier should be in possession of the following articles of saddlery:—

Head collar	stirrup irons and leathers (2)
bridoon	shoe-case and straps (2)
bit and reins	crupper
head-rope	surcingle
saddle, with panels complete	girth
breast-plate and strap	numnah
pair wallets and straps (3)	

¹ This cleaning bag will be carried in the kit bag, except specially ordered.

The above instructions were published for the 2nd Batt. Mounted Infantry, raised in March, 1885, at Cairo, for service with the Suakin Expedition, and are here inserted as a specimen.

APPENDIX II.

1ST BATT. MOUNTED INFANTRY VOLUNTEERS (SOUTH OF ENGLAND
MOUNTED RIFLES).

Commanding Officer.....
2nd in command
Adjutant
Quartermaster

A or Devon Company. O.C.

1st Division	1st Vol. Batt.	Devon Regt.	....	Exeter.
2nd	" 2nd	"	"	Plymouth.
3rd	" 4th	"	"	Barnstaple.
4th	" 5th	"	"	Newton Abbott.

B or Surrey Company. O.C.

1st Division 1st Vol. Batt. The Queen's (W. Surrey) Regt.	Croydon.
2nd Division 2nd Vol. Batt. The Queen's (W. Surrey) Regt.	Reigate.
3rd Division 3rd Vol. Batt. E. Surrey Regt. (6th Surrey)	Kingston.
4th Division 4th Vol. Batt. E. Surrey Regt. (7th Surrey)	Kennington Lane.

C or Kent Company. O.C.

1st Division 1st Vol. Batt. E. Kent Regt. (The Buffs)	Canterbury.
2nd " 2nd " " " "	Cranbrook.
3rd " 1st " " " "	Tunbridge.
4th " 2nd " " " "	Blackheath.

D or Sussex and Hampshire Company. O.C.

1st Division	1st Vol. Batt.	R. Sussex Regt.	..	Brighton.
2nd	2nd	"	..	Worthing.
3rd	1st	" Hampshire Regt.	..	Winchester.
4th	2nd	"	..	Southampton.

Strength—

Officers.....	26
N.C.O. and men	504
Horses.....	515

2ND BATT. MOUNTED INFANTRY VOLUNTEERS (NORTH OF ENGLAND
MOUNTED RIFLES).

Commanding Officer.....
 2nd in command
 Adjutant
 Quartermaster

A or Lancashire Company. O.C.

1st Division 1st Vol. Batt. The King's (Liver- pool) Regt.....	Liverpool.
2nd Division 2nd Vol. Batt. The King's (Liverpool) Regt.(5th Lancashire).....	{ Prince's Park, Liverpool.
3rd Division 1st Vol. Batt. The Manchester Regt.(4th Lancashire).....	{ Fennel Street, Manchester.
4th Division 2nd Vol. Batt. The Manchester Regt. (5th Lancashire).....	{ Hulme, Man- chester.

B or Cheshire Company. O.C.

1st Division 1st Vol. Batt. The Cheshire Regt. ..	Birkenhead.
2nd " 2nd " " "	.. Chester.
3rd " 4th " " "	.. Stockport.
4th " 5th " " "	.. Congleton.

C or Yorkshire Company. O.C.

1st Division 1st Vol. Batt. W. Yorkshire Regt.	York.
2nd " 1st " E. " "	Hull.
3rd " 1st " Prince of Wales' Own Yorkshire Regt.....	Northallerton.
4th Division 2nd Vol. Batt. Duke of Wellington's W. Riding Regt.....	Huddersfield.

D or Durham Company. O.C.

1st Division 1st Vol. Batt. Durham L.I. ..	Stockton-on-Tees.
2nd " 2nd " " "	Bishop Auckland.
3rd " 4th " " "	Chester-le-Street.
4th " 5th " " "	Gateshead.

Strength—

Officers..... 26
 N.C.O. and men 504
 Horses..... 515

3RD BATT. MOUNTED INFANTRY VOLUNTEERS (THE LONDON
MOUNTED RIFLES).

Commanding Officer.....
 2nd in command
 Adjutant
 Quartermaster

A Company. O.C.

1st Division 1st Vol. Batt. King's Royal Rifle Corps (2nd Middlesex)	Walham Green.
2nd Division 3rd Vol. Batt. King's Royal Rifle Corps (5th Middlesex)	St. John's Wood.
3rd Division 4th Vol. Batt. King's Royal Rifle Corps (6th Middlesex)	Regent Street.
4th Division 5th Vol. Batt. King's Royal Rifle Corps (12th Middlesex)	Somerset House.

B Company. O.C.

1st Division 6th Vol. Batt. King's Royal Rifle Corps (13th Middlesex)	Westminster.
2nd Division 7th Vol. Batt. King's Royal Rifle Corps (21st Middlesex)	Pentonville.
3rd Division 9th Vol. Batt. King's Royal Rifle Corps (1st London)	Finsbury Row.
4th Division 11th Vol. Batt. King's Royal Rifle Corps (3rd London)	Farringdon Street.

C Company. O.C.

1st Division 1st Vol. Batt. Rifle Brigade (London Scottish)	Adam Street, Adelphi.
2nd Division 2nd Vol. Batt. Rifle Brigade (14th Middlesex) Inns of Court	Lincoln's Inn.
3rd Division 3rd Vol. Batt. Rifle Brigade (15th Middlesex) Customs and Docks	Custom House.
4th Division 4th Vol. Batt. Rifle Brigade (16th Middlesex) London Irish	King William Street.

D Company. O.C.

1st Division 7th Vol. Batt. Rifle Brigade (20th Middlesex) Artists	
2nd Division 8th Vol. Batt. Rifle Brigade (24th Middlesex)	General Post Office.
3rd Division 9th Vol. Batt. Rifle Brigade (1st Tower Hamlets)	City Road.
4th Division 10th Vol. Batt. Rifle Brigade (2nd Tower Hamlets)	Whitechapel Road.

Strength—

Officers.....	26
N.C.O. and men	504
Horses	515

4TH BATT. MOUNTED INFANTRY VOLUNTEERS (SCOTCH MOUNTED RIFLES).

Commanding Officer.....	
2nd in command	
Adjutant	
Quartermaster	

A or Argyll and Sutherland Highlanders Company. O.C.
 1st Division 1st Vol. Batt. Arg. and S. High-
 landers (1st Renfrew) Greenock.
 2nd Division 4th Vol. Batt. Arg. and S. High-
 landers (1st Stirling)..... Stirling.
 3rd Division 5th Vol. Batt. Arg. and S. High-
 landers (1st Argyll) Dunoon.
 4th Division 6th Vol. Batt. Arg. and S. High-
 landers (1st Dumbarton) Helensburgh.

B or The Lanark Company. O.C.
 1st Division 1st Vol. Batt. Cameronians { W. George Street,
 (1st Lanark) Glasgow.
 2nd Division 2nd Vol. Batt. Cameronians {
 (2nd Lanark) Hamilton.
 3rd Division 2nd Vol. Batt. Highland
 L.I. (6th Lanark) Overnewtown.
 4th Division 3rd Vol. Batt. Highland { London Street,
 L.I. (8th Lanark) Glasgow.

C or The Lothian Company. O.C.
 1st Division 1st Vol. Batt. Royal Scots Edinburgh.
 2nd " 1st " " " "
 3rd " 2nd " " " (1st Mid-
 lothian) Leith.
 4th Division 3rd Vol. Batt. Royal Scots (2nd Mid-
 lothian) Penicuik.

D or The Gordon Company. O.C.
 1st Division 1st Vol. Batt. Gordon Highlanders .. Aberdeen.
 2nd " 3rd " " " .. Peterhead.
 3rd " 4th " " " .. Aberdeen.
 4th " 5th " " " ..
 (Deeside Highlanders) Banchory.

Strength—

Officers..... 26
 N.C.O. and men 504
 Horses 515

APPENDIX III.

Establishment of	Officers.	Sergeants.	Corporals.	Privates.	Horses.		Remarks.
					Officers'.	Troop.	
One division.....	1	1	1	25 1	2 ..	27 ..	Officer's ser- vant.

Establishment of company.	Horses.												Remarks.
	Officers.	Company ser- geant-major.	Sergeant riding instructor.	Farrier.	Shoeing smiths.	Saddlers.	Sergeants.	Corporals.	Buglers.	Privates.	Officers'.	Troop.	
One company of four divisions	5*	1	1	1	2	2	4	4	2	105+	10	114	* Including Officer commanding company. + Including five Offi- cers' servants.

Establishment of one battalion.	Officers.	Sergeant-major.	Staff sergeants.	Company ser- geants-major.	Sergeants riding instructors.	Farriers.	Shoeing smiths.	Saddlers.	Sergeants.	Corporals.	Buglers.	Privates.	Horses.		Remarks.
													Officers.	Troop.	
Commanding Officer..... 2nd in Command Adjutant..... Quartermaster Medical Officer Veterinary Surgeon ... Four companies..... Total	6	1	3*	..	..	..	..	..	..	..	..	12	4 3 2 2 2 2	456	{ * Orderly - room clerk, quartermaster sergeant, and farrier major.
	20	..	..	4	4	4	8	8	16	16	8	420	40	400	
	26	1	3	4	4	4	8	8	16	16	8	432	55		

Establishment of brigade.	Officers.	Warrant officers.	Staff clerks.	Sergeants.*	Rank and file.	Horses.		Remarks.
						Officers.	Troop.	
Colonel of the Staff	4	..	2	..	8	4	2	* Including company sergeant farriers and riding instructors.
Orderly Officer						2		
Brigade Major						2		
Paymaster						2		
Four battalions	104	4	..	124	1,888	220	1,840	
Total.....	108	4	2	124	1,896	229	1,842	

APPENDIX IV.

SCHEDULE showing Horses, Mules, and Camels obtainable in Syria, &c.

Animal.	Average height.	Average price.		Rates of hire per diem.	Weight carried.	Average distance per diem.	Number procurable.	Best points of concentration.	Ports of embarkation.	Remarks.
		Owners.	Dealers.							
<i>Horses.</i>										
Class A	hands. 14	£ from 40 to 300	£ 40 300	piastres. ..	..	..	..	..	..	These are high bred Arab horses, and their exportation as "Chevaux de Race" is prohibited by the Turkish Government.
Class B	14½ to 15	22	25	15 to 20 per diem.	..	8 or 10 hours at 3 miles per hour.	500 in 30 days.	Damascus, Aleppo.	Beyrout, Latakia.	This horse is strong and hardy, bred by half-bred Arab sires, out of country bred mares, having a strain of Cossack.
Class C	13½ to 14½	20	23	"	..	"	"	"	"	This horse has more Arab blood than Class B, and has greater powers of endurance for slow work.
Class D	13½ to 14	14	20	..	300 lbs.	"	1000 in 2 months.	Adalia, Adana.	Adalia, Mersina.	A common bred but strong stout pony; mainly bred in Karamania.
<i>Mules.</i>										
1st Class	14 and upwards	23	26	15 to 20 per diem.	350 lbs.	"	500 in 30 days.	Marash, Aleppo, Damascus.	Latakia, Beyrout.	
2nd Class	less than 14	18	24	"	200 lbs.	"				

N.B.—A large number of horses could be procured from Tripoli and exported at Ben Ghazi, but they are not to be recommended as compared with the above breeds. The Tripoli horse, though well crested, has bad loins, and shows little Arab blood. Price 12*l.* to 15*l.* approx.

APPENDIX V.

CANADIAN HORSES.

Broncho Horses.—These horses, bred on the slopes of the Rocky Mountains or upon the prairies at their base, are strong, powerful, and most hardy animals. What they lack in speed they gain in endurance, and where an English horse would die, these Broncho horses would thrive. The vicissitudes of the climate in the North-West Provinces of Canada makes these alike indifferent to the cold of Siberia or the heat of Africa.

Height 15·2 to 16 hands.

Age 4 years and upwards.

Geldings or Mares.

Prices at Calgary given by Government for	
North-West Frontier Mounted Police . . .	£20
Railway expenses to Quebec	3
Ship expenses to Liverpool	5
Total . . .	£28

Toronto Horses.—A veterinary Officer of experience in the Canadian Service, and a well-known Officer of Canadian Cavalry, give their opinion that a large supply of most excellent horses can be purchased in Upper Canada suitable in every respect for cavalry purposes. It was on horses of this description that the 13th Hussars were mounted when quartered in Canada.

Age 4 years.

Height . . . 15·2 and upwards.

Geldings.

Price £30 to £35 delivered at Quebec
Quebec to Liverpool 5

£35 to £40.

The facilities for breeding in Canada are so great that if once the demand were created for any one especial class of horse, the supply would in a very short time meet it, and the market price remain much as at present.

Comparative Table.

English cavalry remount—

Average price 3 years old	£40
Keep to 1 year	15

Price of 4 years old £55

Broncho horse—

4 year old delivered in England . . .	£28 to £32
Toronto or Upper Canada Horse . . .	£35 to £40

The CHAIRMAN: In inviting you to discuss this paper, I would express the hope that some of the cavalry Officers who are here to-day will give us their views upon this subject, because I cannot help thinking that the lecturer has dealt with it almost exclusively from an infantry point of view.

Lieut.-General Sir EDWARD HAMLEY: My lord, ladies, and gentlemen, my friend Major Hutton has done me the favour to invite me to be present on this occasion, and as it appears to me that his proposals are extremely far reaching, going quite beyond the immediate occasion, for they extend far into our military system, I think it is the duty of anybody who has formed any opinion upon this subject to express it. Major Hutton's proposals are of two kinds: the one is a proposal for procuring an improvised force—small bodies—for an emergency; and the other is to create a considerable corps of mounted riflemen such as would be of importance in a campaign and on a field of battle. He tells us that "some military authorities have advocated a permanent corps of mounted infantry. I venture to submit that this would entirely defeat its own object. Organized during peace, and acting with cavalry, it would be impossible to prevent such a force becoming a very indifferent cavalry." I confess I think Major Hutton has treated those whom he calls military authorities rather cavalierly when he disposes of their views, formed after much consideration, in such a summary manner. It appears to me that this idea of his that they would form a very indifferent cavalry is an idea entirely of his own imagination, founded upon nothing; I will therefore, if I may without offence, venture to call it a baseless assumption. And when he says, "An infantry soldier would under these circumstances soon lose his identity as such, the temptations to become a cavalry soldier would prove too strong," I ask myself is it possible that I hear a British Officer talking of an arm to be created in Her Majesty's Service? What sort of soldiers would these be who being intended for one purpose convert themselves to another? What sort of soldiers would they be who, being intended to become mounted riflemen, make themselves into indifferent cavalry? What would their Officers be about? What would the Inspecting Generals be about who permitted it? And, lastly, what would the authorities be about who, intending to form a corps of mounted riflemen, found that they had only got indifferent cavalry? If such a thing were possible I should hope that the nation would ask the reason why, when soldiers and Officers, Generals and authorities, would all be involved in the same condemnation. I have not the slightest doubt that if the country sincerely and seriously sets about getting itself a corps of mounted riflemen it will get what it wants, and having got it, in my opinion it will have got a force of infinite value, such a force as, if it were in preponderating numbers on the battle-field, might well turn the scale of victory. Major Hutton proposes to get these corps of riflemen from the Volunteers. Now I see a very eminent Volunteer Colonel present, Colonel Macdonald, and I speak in his presence with some diffidence, but nevertheless I see two very important objections to procuring these forces from the Volunteers. The first objection is that the Volunteers are a special force created for home defence. They are to pursue their duties as citizens till they shall be called upon as soldiers to defend the country against invasion. But to call upon the Volunteers to form a force which is to hold itself ready at any moment to go to Aldershot for a fortnight, and then proceed to some distant and foreign theatre of war, is to introduce an entirely new element into the Volunteers, and one which I take the liberty of thinking should not be introduced without very considerable hesitation. That is one objection, and the other is this: the Volunteers are a force that I have a very high opinion of, and I have no doubt that under a proper system, which they have not quite got yet, they will make most valuable troops for home defence, and will be fit to encounter any kind of invader. But what is this you are asking them to do? Volunteers taken from the ordinary regiments are to go to Aldershot for a fortnight, and then they are to proceed to a foreign country to meet what? to meet the trained soldiers of the Great Powers of the Continent. Now I ask is it reasonable to suppose that a body of Volunteers called upon in this way should be fit to undertake at once the most arduous duties which any infantry can be called upon to perform? For remember the duties of mounted riflemen will be very peculiar, very arduous. They will be called upon in emergencies to place themselves in positions where they must be ready to meet any

kind of troops or any combination of troops, and you are about to call upon Volunteers to do that with the trained Continental armies for opponents. I say that to do that would be to invite disaster. So far, then, as to one part of his proposal, that of creating a large force of mounted riflemen and raising it from the Volunteers. The other proposal is to improvise small bodies for emergencies, and Major Hutton tells us what he thinks would be the best way of doing it; and that best way is to take detachments from our infantry regiments. Now I suppose that every soldier in this room has been brought up to believe in our regimental system, to believe that it is something so valuable as to be almost sacred. He has been taught to believe that the units (that is to say, battalions), the individuals of which know each other, live together as comrades, are trained together, know their own Officers, and thereby learn mutual reliance and confidence in each other, form a kind of force which would resist the stress of the battle-field better than those drawn from any other source whatsoever. But I ask what becomes of this idea if our regimental system is to be made ducks and drakes of in this way—if it is to be a mere playground for Major Hutton to disport himself on when he wants to create, on an emergency, a force of mounted riflemen? But I need not pursue the subject by saying what I think myself about it, because we have Major Hutton's own ideas on the matter very well expressed. He has told us what he thinks about it. He says: "The principle of taking detachments from regiments on service for this duty should never if possible be resorted to. You extract, in so doing, from each company in an infantry battalion the four or five best soldiers and leading spirits, men whose example and moral influence among the many young soldiers of our battalions is simply invaluable. Such a principle is vicious in the extreme, and one against which every good Commanding Officer kicks." It is the very system which he has condemned in these terms which he is about to apply to all the regiments apparently in the Service. He is going to draw freely upon them according to his system, and he is going to make every good Commanding Officer in the Service "kick." And to complete the inconsistency, he tells us that in his matured scheme, which is to be a permanent institution, he is going to prepare the regiments next for foreign service to be drawn upon in this fashion, so that actually the very regiments upon which this would fall, are the regiments he has just described as being exposed to all kinds of calamities, if that measure should be carried out in them. Now this appears to me to be an inconsistency which Major Hutton will certainly have to explain. I for my part hold to the belief in the regimental system. I do not believe at all in the idea of making an infantry soldier into a cavalry soldier one day and a cavalry soldier into an infantry soldier the next, thereby creating a sort of transformation scene, which appears to me more appropriate to a Christmas pantomime than to the British or any other Army. It may be said, "If you won't have this, what do you recommend?" Now I am most anxious to impress on you that it is exceedingly desirable and expedient to have a force of mounted riflemen. I would not create that force by disorganizing anything, but by organizing something. As Major Hutton tells us the country is too poor to furnish an additional regiment of any kind, I would begin by making one of our infantry regiments into a regiment of mounted rifles; they should be equipped and horsed for that express purpose and no other; they should be trained entirely to act as infantry and nothing else, never be allowed to engage in any other formation than that of infantry; they should have no cavalry arms; they should have a pure infantry equipment, with such addition as would enable them to ride comfortably; and as for their horses, we ought not to think of mounting them on cavalry horses, but on good serviceable ponies, such as you might buy perhaps on an average at 20*l.*, and which would do a great deal more work in a campaign with light men on their backs than horses of the size of those of our cavalry. Men trained and equipped in that fashion could not possibly pretend to become cavalry. How could they? They would be what you want them to be; they would be mounted riflemen; and if you could show a good serviceable battalion of that kind, well trained, in operation at Aldershot and elsewhere, so that people might see it, I think the public is not so stupid but that it would be convinced of its value, and possibly would have no objection to supply the necessary means for augmenting such a force. I have been exceedingly sorry to differ from my friend Major Hutton, but really I could not help it. I am perfectly well

acquainted with Major Hutton's value as an Officer, and I am quite sure he has been actuated by nothing but zeal for the Service in bringing these proposals before us. But then you see Major Hutton has had an interest already in creating a force of this kind, and, like all of us when in pursuit of an idea, his idea has perhaps become a hobby, and the career of his hobby has led him very far indeed—led him to make inroads on the organized system of the British Army, which I venture to think is a matter of infinitely more importance than that of procuring a small body of mounted infantry. If I were not already aware of Major Hutton's merits, we have here Sir Archibald Alison, the value of whose testimony cannot be surpassed, and who I am sure will say everything in the world in favour of his old follower. Therefore, in the hope that Major Hutton will forgive me for having differed from him, in consideration of the magnitude of the interests involved, I will now conclude my remarks.

Lieut.-General Sir ARCHIBALD ALISON: My lords, ladies, and gentlemen, I have listened with very great interest both to the lecture delivered by Major Hutton, and to the remarks of Sir Edward Hamley. I am sorry to say that I cannot quite agree with Sir Edward Hamley in the view which he takes as to the possibility of organizing a permanent corps of mounted infantry. There is no age almost in which we cannot trace an attempt to create such a force, and I do not remember one single instance in which it has been successful. Our dragoon regiments were formed for this object and for no other. The dragoon regiments in all foreign nations have, I believe, their origin in precisely the same want, and they have all ended in the same way. They have practically become simply regiments of cavalry. As far as I can judge you cannot keep a corps of mounted riflemen permanently embodied without their degenerating into bad cavalry. But I do think that you can get such a corps together for a campaign which will do right good service, if you have in your infantry battalions men previously trained to such a knowledge of horses and of riding as will enable them to keep their horses in condition, and to move at a fairly quick pace on them. I will give you an example of how this works, one which came under my own personal observation. I had once to land at Alexandria with a couple of battalions. I had no guns; I had no mounted men; I was in the face of a large force of the enemy outside the walls, and the walls had breaches in them through which a whole battalion could march. In such circumstances it was absolutely necessary to get some outpost system established which could give us timely notice of the movements of the enemy. As we were marching up from the landing place through the still smoking streets, Major Hutton told me that there were in the ranks of the battalions which I had there, men who had been previously trained as mounted infantry. Marching along we called for volunteers. I sent an Officer to the Khedive, to see if he could get some horses. I got both the volunteers and the horses that night. The next morning a detachment of these men paraded before me at 11 o'clock, and went out to begin the outpost duties of the force. They never lost touch of the enemy from that time until they marched into Cairo with the cavalry brigade, under Sir Drury Lowe, except during the short period when they were passing by sea from Alexandria to Ismailia. I never heard of a single instance during that campaign in which the duty entrusted to those men was not well and thoroughly performed. I think this shows what you can do with infantry when they have got that slight previous knowledge of horse duties which is absolutely necessary. But you must never imagine that mounted infantry can do the duty of cavalry. That is quite impossible. The highly trained cavalry man will always be infinitely superior for cavalry work to a mounted infantry man. You have two difficulties with regard to mounted infantry. On the one hand you must not expect that you can at any moment put an infantry man on horseback, and without any previous training transform him into a good mounted infantry soldier. On the other, you must remember that if you raise a corps of mounted infantry and keep it permanently embodied, you will soon find it degenerate into bad cavalry. The only way out of it at all, that I can see, is that you should have a certain number of men in most battalions at home put through, as opportunity offers, a mounted infantry school, to give them that small amount of horse knowledge which is necessary, and which can be done in three months. They will then be ready for this service if ever wanted. I think it advisable

that this should be done, especially with regiments going to the Colonies. In India it is not of so much consequence, because there, with our large amount of excellent native cavalry, we do not require mounted infantry in the same degree. But in our Colonies we seldom have cavalry, and we are almost helpless if we have not some mounted men for outpost work and quick movements. I consider it an immense advantage that every battalion should have in its ranks a small body of men able to move with the rapidity of cavalry, and possessing the steadiness and fire power of infantry. With regard to a European war it seems a doubtful point whether it might not be advisable, instead of taking detachments from several battalions and uniting them into a provisional one, to pick out a few battalions, eliminate from them all men not suited for mounted work, and put them through the short amount of training necessary. I think it an open question whether this might not be a better system than the only other alternative, which is to take selected detachments from battalions not in the first two Army Corps. The choice lies between these two. The views that Major Hutton has expressed with regard to mounted infantry and their use I entirely endorse, in so far as the regular forces are concerned. In conclusion, I would only add that I do not think it possible either to make mounted infantry take the place of cavalry, or to create such a force at once by taking men from infantry battalions who have had no previous training in riding and the management of horses.

Major-Gen. Sir REDVERS BULLER: Sir Edward Hamley criticized Major Hutton's paper from a general, and I may say a very outside view. I wish to offer one or two criticisms rather on matters of detail. I fancy that the Chairman has foreseen one point, in which I somewhat object to Major Hutton's proposals, as he specially invited mounted cavalry Officers to give their opinions upon the paper. It has occurred to me in listening to his valuable and well thought-out paper, that Major Hutton is a little inclined to be too hard on the cavalry; he rather seems to me to wish that the mounted infantry shall, so to speak, "skin the lamb;" they are to have all the fun, and it is not quite clear what is to be left to the cavalry to do. He gives as the first, and I assume he means the most important, object of mounted infantry, "to provide an improvised substitute for an organized cavalry on small and hastily organized expeditions." Now I cannot help thinking that in the English Army we really do a great deal of injury to our cavalry by the use we make of mounted infantry, for in the late small expeditions, the cavalry to a great extent have been kept away, and have lost the experience that was their share. It has been said, "We will use mounted infantry instead of cavalry." As Major Hutton shows, mounted infantry can only be proved to be cheaper by accepting a worse article. He says the mounted infantry at Suakin were cheaper than the cavalry, but he puts them on worse horses, and therefore estimates for a worse article. I was also at Suakin in 1884, though on a different occasion to that which Major Hutton refers to. We had, fortunately I think, two regiments of cavalry and a very small force of mounted infantry. I believe that no cavalry work of late years in the English Army has been better done than the way in which those two regiments of cavalry, the 19th and the 10th Hussars, took Sir Gerald Graham's force into Tamanieb. I do not believe that any mounted infantry could have done better, and mounted infantry would not have had the value of cavalry, and could not, had they been so required, have been used as such. I think we should hesitate before we accept the statement that mounted infantry are either to replace or supplement our cavalry. I cannot help thinking that we should approach this question more fairly, if we merely dealt with the value of mounted infantry as mounted infantry by itself, and I would in this connection say—and I have heard a good many Officers whose opinions I value say the same thing—that I believe that, as in the last great war, the value of cavalry was very much more fully recognized, so in the next great war will the value of mounted infantry be the most noticeable feature. I believe that the reason that the Germans made so little use of mounted infantry during the French war was because the French Army had been rendered almost entirely immobile by the loss of their field army, either at Sedan or in their large fortresses, and that had the French been more enterprising we should have heard more of German mounted infantry. The second exception I wish to take to Major Hutton's remarks is, that I think he overlooks the absolute necessity that

exists for a mounted infantryman being drilled as an infantry soldier, and as nothing else. I do not think that in any way any cavalry tactics or duties should enter into his drill, and I think when Major Hutton says that in the school that he proposes the men can be taught "the very simple principles of a mounted infantry man's work," he slurs over or joins together two separate subjects, viz., infantry drill, stable management, and riding. I hope if the school ever is started, the mounted infantryman will be taught nothing but the care of his horse, and how to ride it, and that he will learn his drill in his own regiment on foot. It once occurred to me to command a large force of mounted infantry, and almost from the first I found it was impossible to use the same portions of the force for both duties, those which were quasi cavalry and those which were entirely infantry. Almost the first thing I had to do was to set apart a certain number of men, to be used only for scouting and reconnaissance, and what I may call cavalry work, and the remainder were the fighting men to act as infantry, as I found that it was practically impossible to train men to combine the two duties satisfactorily, and that to get the full value out of mounted infantry, the men must always be treated tactically, merely as infantry soldiers provided with a means of rapid locomotion. These are, I think, the only points on which I have to express any dissent from Major Hutton's views.

Colonel Lord WANTAGE: My lord, I feel great diffidence in even saying the few words that I propose to say in the presence of such masters of the craft as those who have addressed this meeting, but I feel that I should not be doing what I think right if I did not thank Major Hutton for bringing this very important question before this Institution. My lord, I remember that in a motion on this subject which I brought before the House of Commons in 1881 I quoted some remarks of yours which occurred in the Wellington Prize Essay, which you wrote in 1871, in which you expressed this opinion, that whoever was the General of the future, if he concurred with the writer of the essay, he would at all events take care to have himself well supplied with mounted infantry in the case of a campaign. It was your fortune to develop the policy of that essay during the Egyptian campaign. I must say that although the highest authorities have agreed on the advantages which an army is to gain from an extension of mounted infantry, it does seem to me surprising how little advance has been made in it during all these years. I would now especially allude to the Volunteers, and here I must at once enter my protest against Sir Edward Hamley's remarks against training Volunteers as mounted infantry. He says that it would not be reasonable that Volunteers should be put to so great an ordeal, and he goes on to say that it would absolutely be courting disaster. Well, now, in my opinion, if there is an aptitude for which British subjects are peculiarly fitted it is the aptitude of the managing of a horse and using a rifle. It is a very extraordinary thing that although you might suppose our Volunteers might make the finest mounted infantry in the world, at the present time we have only forty men who are trained as mounted infantry. Let me make this remark on what Sir Edward Hamley said. He said that "to withdraw the Volunteers from acting as the defenders of their country would be a mistake." Now there are two distinct and separate advantages which the country derives from the Volunteer Force. They seem to be quite apart; the one is the certainty which under Providence we may claim of protecting this country against invasion, and the other is the advantages which the Volunteer Force affords for educating and training the people to be citizen soldiers, through our Volunteer Officers, and through the permanent staff, including the Adjutants, of whom I always speak with the greatest respect. I think more might be done to develop the Volunteer Force as a training establishment than has yet been done, I mean in training the youth of the country in military exercises. The Volunteers send into civil life about 40,000 men every year trained as soldiers. They might go further and train a proportion of these men as mounted infantry, and I do not know a mode in which better service to the country might be done than by so training men for that particular force. It is a service congenial to the tastes of the people. I know Volunteers would like to have the opportunity of being taught as mounted infantry. A great European war is not an impossibility. If there be a war, I suppose England might place at once two corps d'armée of regular soldiers in the field.

But we should have to expand our Army beyond that, and how are we going to expand? There are many ways of expanding I dare say, but I know one way in which you might expand very readily. You might go into market, and offer to enlist men who have been trained as Volunteers, and in that way you might have a vast number of men who would come to your ranks. The more your civil population is trained the better, and the more men are trained as mounted infantry the better. This enlistment may take place without in the slightest degree interfering with the constitution of the Volunteer Force. I know that my noble friend (Lord Wemyss) has been always jealous of Volunteers being called upon for anything except to defend their country, and I agree with him, but I see no reason why Volunteers should not lay aside the Volunteer uniform and enlist as soldiers for a campaign for six months or a year, or whatever the period may be. The Volunteer corps which would be most acceptable would be corps of mounted infantry, and were I young enough I would like to take part in the glorious deeds reserved for such troops. We have done nothing to teach our Volunteers mounted infantry work, and this is a thousand pities. Secretaries of State have shown the cold shoulder to the development of the Volunteer Force. In this direction Officers have asked to be allowed to form Volunteer mounted infantry, and the reply has been, "We are afraid the Yeomanry would dislike it," and "You will interfere with the Yeomanry." The Yeomanry can take care of themselves; they are better paid than the Volunteers, and if they cannot take care of themselves I am afraid there is nobody can. There is no reason why Volunteers should not run *pari passu* with the Yeomanry. Major Hutton asks that mounted Volunteers should be paid on the same scale as the Yeomanry, but I know Volunteers won't get that. The financial condition of the country is such that you will not get that. I do not know that we shall get anything extra, but if we only had the loan of some equipment and saddles free of cost we could at all events train some of our men, and it would be some help to us. If that were done, when an Inspecting Officer came down, he might say "he would like to see some of the men who have been trained at our ranges under our own staff act as mounted infantry." But when accoutrements have been lent to Volunteers, as in my own case, we have had to pay for the things, although they were partly used. I cannot see any reason why they should not be lent to Volunteers who, at all events, are doing their utmost in the public service. I do not suppose that a word need be said to show the advantage of these mounted infantry. If I might compare a battle-field with a chessboard, I might say that supposing, at a critical period in the game, one of the players was permitted to turn two or three of his pawns into knights, supposing the players to be equal in skill, who can doubt which player would have the best of the game? It really amounts to this, that a longer reach is given to your infantry. I do not desire that infantry should have anything except the opportunity of getting more rapidly from one place to another, more rapidly than infantry soldiers can do. You double and treble the rapidity with which soldiers can move, and you, in an equal proportion, increase the amount of ground over which they can travel. I am speaking now of Volunteers, I say nothing about the regulars. Distinguished military men are now taking this question up. If they wish to see it developed in the regular service I have no doubt they will attend to it; but I do hope that in the Volunteer Force there will be an effort made to advance this most useful arm.

Colonel J. H. MACDONALD: Speaking as a Volunteer Officer, I can most thoroughly corroborate what has just been said by Lord Wantage. So far from its being the fact that the authorities are encouraging this movement, they have put an absolute stop to the enrolment of any men as mounted infantry in the Volunteer Force at present. I have the satisfaction myself of being the last Commanding Officer who had permission to have some mounted Volunteers. I have now about eighteen or twenty mounted men in my corps, and I should be very sorry to lose them. As Lord Wantage has said, they got no encouragement; the stipulation on which I was ultimately allowed to enrol them—which I was only allowed to do because I was able to show we had made a considerable outlay already, not knowing that an order would be issued against it—was that not one sixpence of expense was to come against Her Majesty for the organization of these troops. A good deal has been said on the question as to whether the Volunteer Force would be a useful force

for the purpose of organizing mounted infantry. I thoroughly agree in what Lord Wantage has said as to the probable usefulness of the Volunteer movement and the Volunteer Force in a different direction from that which tends only to the defence of the country from invasion. But, on the other hand, I feel very strongly that to attempt to turn the Volunteers in their ordinary work in peace time into anything in the nature of a paid force would be a mistake; therefore I do not agree with the views of the lecturer that men who are to be enrolled out of the Volunteers as mounted men should receive any pay at all in time of peace.

Major HUTTON: That was not my suggestion.

Colonel MACDONALD: I am glad it is not so; I must have misunderstood. If anything is to be given to encourage the formation of mounted Volunteers it should be given in the way of providing the equipment of the force. I think it would be the greatest possible mistake to Volunteers mounted upon any kind of screws that are to be picked up, to be enrolled as mounted infantry. In my own corps I make it a distinct stipulation that every man is to provide his own horse, and for the small number required attached to each corps, I think, with the love of sport which there is in this country, there should be no difficulty at all in obtaining men with proper mounts, if only the Government would give some little encouragement in the way of meeting the necessary expenses. There is another matter which deserves consideration; it is the question whether these mounted men should be organized upon the footing of only one man for each horse, and I should like to know from the lecturer what his views are upon that subject. It seems to me that as regards mounted infantry it is a serious waste of the expansive power of horses to have say twenty horses with only twenty men to form the mounted infantry attached to a corps.¹ In a great many cases, in fact in almost all cases in which mounted infantry could be used, there is no necessity for a very high rate of speed. Your only object is to be able to move your men at a considerably more rapid rate than infantry, and therefore to be able to move round to and from posts which might not be safe for unmounted infantry to hold. Would it not be a good plan to have double the number of men to horses trained for this purpose? If men are to make a bolt of 300 or 400 yards, the man on horseback having his own rifle in his bucket or slung on his back can easily carry the other man's rifle, and the other man holding on can very well get over the 300 or 400 yards to escape from danger of capture or to take up another position. I shall be very glad to hear what the lecturer may have to say on that matter. There is one subject which has been referred to by the lecturer which I think deserves serious attention, and that is the necessity for the strictest possible drill, and not having, as is so frequently suggested by many people, a loose system of drill. It is often supposed that those who are in favour of abandoning particular forms of drill wish to have a "loose" system of drill. The whole desire of those who wish to see our system of manœuvres altered is to transfer the mechanical operations of drill to those forms which alone are useful in the field of battle. The looseness which prevails now arises in this way, that you persist in moving your men about for months and months upon parade in a mode in which they never will move in the field, and when you turn to what you call "action exercises," you immediately introduce a new system, in which you never include any careful steady attention to minutiae at all. It would be infinitely better I suggest, Sir, both for infantry and for mounted infantry, if the drill were so adapted that your stiff and steady training should be given in the same formation as your more extended and more "action exercises," if I may so call them. I think this very lecture illustrates that most admirably. Who can suppose that it would be of the slightest use for men who are to be employed as mounted infantry to be set down as infantry on foot without their horses, and taught to move about in barrack yards for weeks and weeks touching one another's elbows? When they go out with their spurs, that is a thing they will never do when dismounted. I say, then, let us move them and all infantry about in the barrack yard with intervals between the men; teach them to observe those intervals with the utmost exactitude; train them to do all that with the most perfect mechanical detail, just as you

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do now in the close touch formation—the shoulder to shoulder drill—and you will teach them something which will be practically useful. The old system may contain many useful details for effecting a certain amount of discipline and steadiness in the men, but it is not the kind of discipline you want, and one writer whom the lecturer quoted, M. Rogniat, uses a very just expression which is more applicable now than it ever was, when he calls upon the tacticians of his time to abandon “une abondance stérile,” a quantity of unproductive manoeuvres which will effect no good result, and to confine themselves to those which, to use the words of Guibert, are “relatives à la guerre,” then, he says, you will get a system which, instead of worrying the souls of men, will be interesting to them, and will really train them for the business they have to do. I trust it will not be supposed that the Volunteers have any desire to affect a loose style of drill. That word “loose” is often used in a most misleading sense. We are told that when men cease to touch one another, their drill must become loose. I was delighted in this theatre some time ago to hear Sir Lumley Graham express the opinion that movement without touch was not loose drill at all; that looseness consisted in want of strictness, and that men could move just as steadily with an interval as they could with touch. And this confirms my own experience.

Colonel the Hon. PAUL METHUEN: My lord, ladies, and gentlemen, it was my fate last time I spoke in this room to speak after my friend Colonel Macdonald, and I am bound to say I differed with him in most of the arguments he then made use of. Now I wish to go back to what I think is the principal subject of this lecture. It is no use talking about what the drill is to be, till we know we are to get the men for a mounted infantry corps. We hear from those Officers who have spoken that the first thing we are not to do is to ruin the *esprit de corps*. Now there are very few will contradict me when I say, supposing even you do get the detachments from different regiments of the Service, which are composed of so good men as can be, still the detachments from the different regiments are not so good as troops forming one regiment. It is far better to have a good corps of mounted infantry than to have any number of men from different regiments, and I contend that if the Government does not see fit to give us a corps of mounted infantry for a permanency, it is perfectly impossible for us to have such a corps as I consider necessary unless you turn either to the Volunteers or recruit from the better classes in this country. When Lord Wolseley was in Egypt in October, 1884, and it was very hard indeed to find troops to do the work required, I then called upon Sir Arthur Herbert and offered to raise a corps from the Volunteers. Now Sir Edward Hamley has remarked it is not the rôle of the Volunteers to serve abroad. Have men from the Post Office Corps served abroad with the Army or not? What is the difference between the Post Office Corps and the remainder of the Volunteers? Surely they may equally serve abroad; and I believed when I went to Sir Arthur Herbert and asked him to allow me to raise 500 men from the Volunteer Corps, I should have had no difficulty. Although Sir Charles Warren gave me every help in raising a corps in November, I found there was very great legal difficulty in enlisting men in England. He said, “You will have to get your men from the farmers and the gentlemen about the country,” and he said, “You must get your men as quickly as you can.” Well, I got the very best men I could, and the only men who came to me, who in some cases failed eventually, were the old soldiers. There is this difference in the old soldier, he is either a very good man or a very useless man. I do not think anything you can name runs so quickly to seed as the old soldier. I had some old soldiers, you could not have had better; I had some, you could not have had worse. When the corps reached the Cape some few grumbled, but I will say this for them that, taken as a body, I never wish to serve with a better behaved lot of men. You know what twenty or thirty bad characters will do in a regiment; they show up to the damage of all good men, but from the time I left England to the time I came back I know I shall never command another 500 men who would do the work better than they did. I speak in an especial manner of the gentlemen and farmers in the corps. It is often said to me, “Your men could not ride.” Well, who has ever gone out hunting, and when you have come to a stiff fence has seen every one go over it? My experience is a large number refuse. It is very hard to find 500 men who can ride well at once, and it is

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equally difficult to find men who shoot well with a rifle and are good active men all round. It is very easy to find men who are good shots at a standing target, but very hard to find good shots at moving objects who will ride their horses over a fence and are thoroughly good men all round. It is specially difficult to get men out of the Volunteers who can both ride and shoot well. I may be asked, "What do you suggest as an improvement?" Well, I would suggest a school, as Major Hutton says. It is equally difficult for a cavalry Officer or an infantry Officer to take command of a mounted infantry regiment. I had no idea until I got command of the regiment how very hard it was, and I noticed that where a cavalry Officer got the command of a regiment, without knowing it he treated the corps from a cavalry point of view, whilst I looked at it from an infantry point of view. I certainly should have commanded it much better if I had gone to a school at Aldershot. This applies to non-commissioned officers just the same. You want a man who knows a horse, and you want a man who knows infantry drill. This must be taught in the school, and therefore when you call for another regiment you should be able to provide the corps with Officers and non-commissioned officers who have been to some training school. Time is another object. You require a month or six weeks for training. I only had a fortnight, and that was a very short time. The question comes what number of men you could raise. I have not the slightest doubt that in a month or six weeks' time you might get men enough for a brigade. The Commanding Officer should have the veto of taking Officers sent him or not, because Commanding Officers do not always give precisely the stamp of Officer required. I think if we had all these advantages given to us, we could produce in that time as good a regiment or brigade as could possibly be produced in any army. I am of opinion such a regiment should not receive higher pay than the cavalry. It is a very great mistake to give men a higher pay than that received by troops serving alongside them in the field. I would not even give them a bounty or promise any gratuity, but if they did the work well you might give them a present afterwards. I am perfectly certain you have available at any moment a body of men of the very best class that the country can produce—a body of men who are ready to serve not for pay, not only to see active service, but because they know that we cannot spend our lives better than in the field in the presence of an enemy.

Major Lord MELGUND: The lecturer has referred to the possibility of drawing a certain supply of horses from Canada, and as I have not very long returned from there, it may not be out of place if I say a few words. I had occasion when Colonel Russell gave his lecture here last summer to refer to the subject, and since that time I have had a great deal of correspondence with Canada about the supply, and a good deal of information has been sent to me. There is no doubt, I think, that the supply is very large, but little seems to be known of it in this country. As to the quality of the horses it is difficult in Canada to find a badly bred horse at all. You may divide them into several different classes, those suitable for transport and those suitable for light cavalry and mounted infantry. For the transport, the horses most suitable are those crossed with Clydesdale horses and Canadian mares, and also a cross with "Percheron" horses and the Canadian mare. The "Percheron" horse is the horse that was used in the days of posting long distances in France, mottled grey, with good action, and likely to produce very good stock. As regards transport horses, any one who was on General Middleton's line of communications would have been struck by the extremely good looks of the transport horses on that line. They showed a great deal of quality, indeed it was almost impossible to find a bad one. As to cavalry horses they would be procured from a cross between thoroughbred English horses and Canadian mares, and also from the Broncho. In the north-west the horse chiefly used is the Broncho, and of all horses I have ever seen they certainly are far and away the best for light cavalry. The average height is 15·2 and 15·3. They are very hard, show a deal of breeding, and they can go for ever. They have, however, two faults which might be pitched upon, one is that they are all branded, and the other is that none of them know how to trot. The ordinary pace is called the "loup," a sort of hand canter, and they "loup" along for about fifty miles without any difficulty. I will show from a few figures what the actual supply is. In 1871, in Ontario, Quebec, and the Maritime Provinces, the total number of horses was 836,743. At the census of

1881 it was 974,292, showing an increase of 16 per cent. in those provinces, and that is leaving out Manitoba and the north-west, which, of course, it was impossible to reckon on in 1871. Since that time the supply has largely increased owing to the American duties. Formerly there used to be a very large exportation from Canada to the States, but from the strict manner in which the States authorities enforce the duties now, the Canadians do not send nearly so many horses out of the country. At the same time American agents do go frequently to Canada, and it is no rare occurrence for an American agent to buy 200 or 300 horses in ten days. I am told it would be quite possible in two months in Canada to buy 2,000 horses suitable for transport, and 1,000 suitable for cavalry purposes. The census taken in 1881 for the whole Dominion gave 857,855 horses and 201,503 colts and fillies, making a total of 1,059,358. But you will best understand the large supply that there is in Canada from this statement. Colonel Russell in his lecture last summer gave a comparison of the number of horses to the population in different countries: Russia, 235 horses to every 1,000 inhabitants; Austria, 100; France, 80; Great Britain, 84; and Italy, 25. Canada has 240 horses to every 1,000, and I think that is a pretty good proof that the supply is tolerably large. As to prices I have a great deal of correspondence, and I think it is pretty well agreed that transport horses could be delivered at Montreal at an average of from 32*l.* to 35*l.*, and cavalry horses at 32*l.* per horse. So that, I think the prices would not be high. All the estimates sent to me have been too high as to the cost of bringing horses over from Canada to this country. It has generally been reckoned at 10*l.* per head, but I am informed that in the case of larger quantities of horses, that is to say shiploads, with the present improved means of communication, and the large ships which are now especially fitted for carrying cattle, the probable cost of the sea-passage would be 3*l.* 3*s.* per head, and that they could be insured at 2*l.* a head on the prices I have named. Of course there has been a great deal of talk in Canada about the possibility of forming some sort of Government depôt, and Major Hutton alluded to it in his lecture. There is much that is very enticing in the formation of an Imperial mounted depôt in the ranche country, and in some ways it might be possible, but in the face of bad times here it would be extremely unpopular in this country, and on the whole I am inclined to think that at present such a plan is theoretical. But, on the other hand, it appears to me that the possibility of getting an annual supply or a large supply on an emergency is well worth considering, and if the information I have been able to give is of any use, I shall be very glad.

Colonel Sir LUMLEY GRAHAM: I should not have risen in the presence of Officers who are more able to speak upon this subject than I am if it were not for some remarks that have been made by Lord Wantage and Colonel Methuen. Those remarks applied to what Sir Edward Hamley said, and as he has left this meeting he is not able to say anything to correct the misapprehension that I think both Lord Wantage and Colonel Methuen have formed with regard to his meaning. I do not understand Sir Edward Hamley to undervalue the services of the Volunteers (he is the last man to do so): or the qualification of Volunteers as mounted infantry or the inexpediency of instructing them as such, but what I understood him particularly to find fault with was the idea of the lecturer that a large corps of mounted infantry should be formed of Volunteers for service in any Continental war. It is true the first reason Sir Edward Hamley gave against this suggestion was that he did not think the Volunteers ought to be called away from their legitimate duties at home. That objection may be answered by what Lord Wantage and Colonel Methuen said. But I think the second reason was still stronger. Sir E. Hamley said he thought it would be courting disaster to send partially trained men against the most highly trained troops in the world. I think so too; and it appears to me that this is an argument that Lord Wantage and Colonel Methuen did not seem to grapple with. Coming to the lecture itself, I find that there are two modes of employing mounted infantry mentioned. The first is to provide an improvised substitute for an expensive cavalry in our small expeditions. I have no doubt that this is necessary. It is an evil, I believe, but still it is a necessary evil. Any improvised force is only a makeshift, but if you must have an improvised force of mounted men for our small expeditions in wild countries, it is very pos-

sible that the only way of obtaining them is to get men from our infantry regiments for the purpose. I think, however, that in Colonies like the Cape of Good Hope and Natal, a local force might be organized to be used as mounted infantry in case of war with the natives. If not, I suppose the only resource we have is to employ our own infantry soldiers. Then as to the way of raising them; I quite agree with what Sir Edward Hamley said about the inexpediency of breaking up units, and that clearly discipline cannot be so well maintained in a body of troops composed of detachments from a great many different corps, and I wonder whether that is the reason that the evil alluded to by the lecturer made itself felt in the late war. We know that in the last Egyptian campaign the system of putting together detachments from different regiments was carried to a very great extreme, and we were told by the lecturer, I was very sorry to hear it, that there was a great absence of obedience, a great absence of fire discipline. I am not surprised at it under the circumstances, but I hope that the state of things described by the lecturer was exceptional; otherwise it could only be attributed to one of two causes, either to a deterioration in the English national character which I should be sorry to believe, or else to some very great want of training. The second may be partially true, but I think that probably the chief reason for the want of discipline complained of by the lecturer was the faulty organization of a large part of the force. Officers and men were excellent, no doubt, individually, and if they had not been so excellent I believe that a great disaster would have occurred; as it was, no doubt they did their work as well as, and better than, could have been expected under the circumstances. The second way in which the lecturer assumes mounted infantry to be used, namely, as a large auxiliary force for an army in European warfare, seems to me to be a mistake. I think the same objection that I mentioned just now in speaking about the employment of Volunteers for that service would apply to the employment of regular mounted infantry, not permanently organized as such (that idea seems to be generally scouted), but mounted infantry raised for the purpose on the spur of the moment, as the lecturer suggested might have been done if war had taken place last year. I think that mounted infantry thus raised, and necessarily only partially trained, would be utterly unable to cope with the trained troops of foreign armies. We must remember that two of the most warlike nations of the Continent are training their cavalry to a very great extent to fight on foot; one at least to a far greater extent than we have ever trained cavalry yet, and I venture to think that that is the solution of the question. I am not a cavalry man, so that it is not a case of "nothing like leather," but I think the real solution of the question is to increase our force of cavalry, and if it is necessary to dress it, equip, and arm it in a more practical way, so that the men should not be obliged to do what the lecturer said, run about with a topheavy busby and a clanking sabre, and that sort of thing, which would be very awkward on foot, but that they should be dressed in a practical service-like manner; they may have smart clothes for home service, but for the field let them be dressed in a practical manner. It appears to me cavalry thoroughly trained to act as infantry at need would be very much more valuable than any improvised force of mounted infantry you could in any fashion raise. The impossibility of training the same men to be efficient cavalry and efficient infantry has been alluded to by more than one speaker, and many great authorities have been quoted on the subject. It was stated by Sir Archibald Alison that the experiment had been tried in every age and had always failed. But yet two of the greatest military nations of the Continent are trying it now; they have not given it up as a bad job. The Germans scouted the idea of mounted infantry, they say that their cavalry may be made to do all the work that is required of mounted riflemen, and moreover believe that the cavalry thus trained will not lose the power of showing the dash displayed so conspicuously at Rezonville. It remains to be seen whether they are right in this assumption, and I am inclined to think that ultimately, if the higher authorities insist upon the performances of this double duty, well-trained cavalry will be found equal to the task. Take the case of pure infantry; foot soldiers are very often required, particularly in the present day, to dodge behind cover, to act strictly on the defensive, to hide themselves as much as possible, and to do a great many things which would seem rather to injure their offensive position, but the very same men may be required on another occasion to

charge in the most reckless way a battery or position, and carry it in the face of great odds. We do not find as a rule that they shirk that sort of work. I think it only a question of training, instruction, and discipline, and you may make the same men excellent fighting cavalry and good useful infantry. The Russians have converted the whole of their line cavalry into what is practically mounted infantry, but they are expected to act as cavalry, too, upon occasions. These "dragoons" are armed with a long rifle and bayonet to work with on foot, but they are also armed with a sabre, and are expected to fight on horseback too. It remains to be seen whether the experiment will answer.

Colonel CHARLES EDWARDS, 2nd West York Yeo. Cavalry: It seems to me that the Yeomanry must enter so largely into the consideration of the questions which have been raised by the lecturer that some Officer of that force ought to take part in this discussion, and therefore as briefly as possible I should like to express to you what I believe to be the views of Yeomanry Officers upon this subject. The Officers of the Yeomanry are not averse to their men acting as mounted riflemen, but they do not want them to be converted into mounted infantry, for this reason, that in the first place the Yeomanry wish to serve primarily as mounted troops, and in the second, mounted infantry must be the very perfection of infantry merely temporarily mounted for tactical purposes, and to this standard of efficiency neither the Yeomanry nor the mounted men attached to Volunteer Corps can hope to attain. On the other hand, this force presents the very best materials for mounted riflemen, and I hold that from the Yeomanry could be raised as valuable and efficient a body of mounted riflemen as you will find in any country out of South Africa. With reference to the scheme Major Hutton has proposed in Section 3, with all deference to Lord Wantage's remarks, I would say that from the Yeomanry alone, or at all events with their co-operation alone, you will be able to carry out that scheme. My experience of the Volunteers tells me that you cannot expect to get from them a sufficient number of men possessing the necessary qualifications for mounted infantry. As a rule Volunteers are raised in large towns, and from a class of men utterly unacquainted with horses or stable management, or even with a knowledge of the country and the signs of nature, and if you put such men on horses, I do not care from what class they come, who are not accustomed to the care of horses, and set them to gallop about the country, you will in a very short time have as many sore backs as you have horses. In support of what I am saying, I would refer to Appendix II in the lecture. The C Company of the 2nd Battalion corroborates my theory. That company is formed from regiments with which I am acquainted, and which are raised in the county which is always supposed to be the most horse-loving county in England, and yet I do not believe that you could get one division of men possessing all the characteristics of mounted infantry out of those battalions, and in looking down the list of headquarters I do not feel more sanguine. I would make one suggestion, which I believe to be highly practical, and that is, if you do want to raise a force of this kind, either as an auxiliary to the regular forces, or as a purely auxiliary force, the Government should look upon the Yeomanry in precisely the same light as they look upon the Post Office Volunteers, namely, as troops possessing special qualifications for special duties, and as in an emergency they call upon the Post Office Volunteers for men to perform duties connected with the postal and telegraph services of the Army in the field, so they should call upon the Yeomanry for a contingent of mounted riflemen. In the result of such an appeal I have every confidence. On two occasions when war has been imminent, I have volunteered to raise a regiment of Yeomanry for service abroad, and my appeal to the men has been responded to in the most satisfactory manner. I know that a similar result has been obtained by other Officers, but at this late hour I will not trespass on your patience any further.¹

Colonel CHURCH, 3rd Middx. R. Vols.: I should not have had the presumption to address you to-day, if it were not that I am in the position of being one of the

¹ Had time permitted I wished to have taken exception to the lecturer's curt dismissal of the idea that the Yeomanry could ever become cavalry. His expression "six days' training" is altogether a misnomer, and in no way represents the duty annually performed, or the many weeks of riding school with which men and

other Volunteer Officers who have at last obtained liberty to form a detachment of mounted men. It may perhaps be useful, with reference to the force to which I belong, to say in very few words what are our real difficulties, and the way in which we think we may overcome them. The regiment which I command has detachments all over the north of Middlesex, from the River Lea to Hampstead and Hendon, and for years I have had thoroughly good infantry men in my corps, as far as we can make them good men, who have their own horses, and who were anxious to enrol themselves in a force of mounted infantry, not for service anywhere else, but with our own particular battalion, and for our own particular service. We had considerable difficulty in getting this leave; we were always received with the greatest kindness by the military authorities, but I believe our applications always came to grief when the official Secretary at the War Office had to look through the estimates. However, on my third application I obtained leave, with the usual caution that there was to be no expense to the country beyond 30s. per man per annum. I must say, as far as matters have gone, I have received every assistance from the War Office with reference to accoutrements, but they were obliged to wait before furnishing them, until some accoutrements that were out on loan had come back again. We got some partly worn ones supplied, after the manoeuvres at Easter were over: they were very cheap, being only about a quarter of the original cost. Now it seems to me the first matter to be considered is that I was very much struck with Colonel Russell's lecture with reference to remounts and the cast horses of the cavalry. If we could only get these at a moderate price (for you get nothing given to you), some of these cast horses would be an enormous assistance. Although your men may be nothing but mounted infantry, still, whenever you have a horse, you like to have a good horse if you can, and if you get a dozen men out as mounted infantry, you like to have the horses somewhat uniform, and somewhat accustomed to the ordinary things which disturb hired horses, firing, bands, and things of that kind. Therefore I believe that if any suggestion of that kind can be carried out, it would be an enormous assistance to us. There is one other particular matter which no doubt could be readily got over. I am thinking of filling up a vacancy in my regiment among the permanent staff of instructors, by having a man who served with the mounted infantry in Egypt, and who is now giving instruction to my men. The difficulty that I shall have first to meet is one of the Volunteer regulations that says that when you apply for a sergeant instructor, he must belong to the particular battalion or battalions to which you are allied. Well, if they have a good man, all well and good; but in all human probability there will not be a man competent to teach mounted infantry drill at our dépôt. I daresay there will be a way out of it, but it is very important to secure good instruction. The next matter is this, that when you go to the field drill, there is not the slightest consideration paid you with reference to your horses. It seems to me that it is a frightful difficulty in this country for any railway company to put a couple of horseboxes on to any train at all, and when they do get your horses on the line, when it is made a favour by writing to the general manager of this company or of that company, it does seem to me a ludicrous thing that you cannot send twenty horses down on any railway by giving a short notice, and that those horses cannot be delivered at their journey's end without being ten or twelve hours on the road, where ordinary trains take two hours and a half. That seems to me a thing which the War Office or the authorities ought to get over. It is a matter that requires a little pressure. The fares are just the same with reference to horses sent down in that way as they would be if you sent your own horse, and you were going hunting. That is not quite the thing; you ought to have the power of sending carriages and horses used for military purposes at military rates. I sent a service wagon to Shorncliffe the other day, and paid just as much as if I had sent my own carriage; that is not right. It would be very improper for me to express an opinion about the mounted infantry question generally in war. What we want our men for is the service of our own

horses should be credited. Three or four strong regiments of admirable cavalry might be raised from the force in a very short time, and we should therefore hesitate before we alter the training of the Yeomanry in the manner he suggests.—C. C. E.

individual battalions. You cannot have outpost drill, as I am happy to say I have been having it in my own regiment for some years, properly conducted without having mounted men for the purpose of keeping up communications and scouting. I assure those who have not tried the experiment, but who have thought about it, that if they will only try it in districts suitable for raising these mounted infantry, they will find it give a great deal of interest and life to their drill. I do not think you can possibly expect to have mounted detachments in regiments where their headquarters are in towns, because if you have to hire horses, it is fatal to the whole thing.

Major the Hon. JOHN HENRY NAPIER: My friend Major Hutton has drawn attention to a subject which no doubt should be settled, and ought to have been settled long before this, a subject which has been brought prominently before the public from time to time ever since the first Afghan War. I think, however, that his idea of creating a mounted infantry force from the regular infantry regiments by drawing detachments, is not a practical way of settling the difficulty. I maintain, from personal experience of an infantry regiment, that there is nothing so likely to demoralize and to render it useless in the field as the practice of withdrawing from its ranks volunteers such as you require, and such as would be drawn for this mounted infantry or other special corps. It has a most demoralizing effect upon the men remaining in the ranks; it withdraws just that percentage of *esprit de corps* and manly dash which is necessary to lead men in the field. For example, my own regiment, the 92nd Highlanders, when on service in Afghanistan, had to contribute a mounted infantry corps; had this corps been obliged to take the field and leave the impoverished ranks behind them, I think the regiment would not have done the gallant service that it did. I can quote in proof of this that Major White, now General White, *V.C.*, and Adjutant Dick-Cunyngham, *V.C.*, were both selected as mounted infantry Officers. What effect would such a loss have had on the regiment? The two most gallant Officers in the regiment taken out of it at the critical time when they were most wanted—what would have been the result, I say, on the 500 men left in the ranks? I perfectly agree with every word that Sir Edward Hamley said as to the detrimental effect that such a proceeding would have upon British infantry. I will, however, lend my cordial support to Major Hutton, in his contention that it is useless to create a special corps of mounted infantry, for I believe with him, that they would only degenerate into bad cavalry. I think one of the other speakers suggested a practical way out of the difficulty, namely, that the ordinary infantry regiment should be taught to ride sufficiently well to transport them from one place to another, which is what we really want to do. We want to carry a pony force of riflemen from one spot in a limited space of time to another, and that could be effected by giving the men an elementary idea of riding ponies. Those ponies would be supplied at Aldershot or other military centre. The rest of the duties of mounted infantry can be and have been well performed by cavalry regiments. The 15th Hussars, under Colonel Luck, supplied a force of mounted infantry, which was out and out better in every possible respect than any impromptu force that has yet been created. The 15th Hussars were able to dismount and climb over difficult ground; all they required was an easy pair of boots and an accurate rifle to make them the finest infantry in the world.

Colonel FRANK RUSSELL, Royal Dragoons: My lords, ladies, and gentlemen, I should not have ventured to trouble you if the Chairman had not invited cavalry Officers to offer remarks on this subject, and therefore, as no other cavalry Officer has hitherto spoken, I shall ask permission to make a few remarks, which I need scarcely say will be of the shortest description. It has been taken for granted that if any mounted man is trained to fight properly on foot, and to use his carbine, he will therefore become useless as a cavalry soldier. I see that the lecturer quotes various authorities in support of this view, mentioning Rosser, and "one of our best known authorities upon cavalry," whose name, however, he does not give. I venture to think that these opinions are slightly opposed to all the lessons taught by recent campaigns. I have taken the trouble to read very carefully the records of the French and German war, and I find that on many occasions the German cavalry were used on foot with the greatest possible advantage, and no one

can say that they did not also perform their duties as cavalry with great efficiency. It appears to me, as a cavalry Officer, that it is a positive slur upon our branch of the Service to suggest that we should not be properly instructed in the use of the weapons with which we are armed. I also believe that if cavalry are trained to fight on foot, they can perform all dismounted duties just as well as mounted infantry. The cavalry, however, is a very expensive force, and I am sure we all agree that, as regards numbers, it is far too small, hence we should welcome all the more warmly the establishment of mounted infantry as a help and assistance in time of war, more especially as it will be an inexpensive force, which there may be some chance of the House of Commons sanctioning, while they would not agree to an increase in our cavalry. The lecturer and Lord Melgund have been kind enough to refer to a lecture that I gave here last year on the subject of horses. I can only now repeat that I am more than ever impressed by the lamentable and crying want of a reserve of horses. In a campaign there is a far greater wear and tear of horses than of men. I need scarcely refer to the Crimean campaign, when our entire force of cavalry was dismounted. I therefore most earnestly hope that when the question of mounted infantry is considered, that necessity of a reserve of horses will not be forgotten.

Lieutenant-General Sir JAMES HILLS-JOHNES, V.C. : I will not attempt to make any observation upon the lecture, as there is no time for me to do so, but will only give my support to the statement made by Sir Lumley Graham and Major Napier, that the cavalry can be trained to take the duties which it is thought can only be performed by mounted infantry, and will be a more effective force, and I will strengthen this opinion by pointing out that the moral effect of the knowledge that a force which has suddenly developed itself by its rapid movement on the flank of an enemy or on any other point, can, after developing a heavy fire, suddenly transform itself into cavalry and charge will be immense. This is, in my belief, the reason that the armies of Germany and Russia have taken up the question of training their cavalry, not as mounted infantry, but to take up the rôle which it is intended that mounted infantry should take, and I am quite certain that this training will tell greatly in the next war in which they are engaged.

Major HUTTON : At this late hour it will be almost impossible for me to reply in detail to the criticisms which have been offered. Sir Edward Hamley opened the discussion by speaking rather strongly on the subject, and rather implying that I was suggesting some alteration in our present military system. It was not my intention to do anything of the sort, and I am not in a position to attempt to criticize the system that exists at the present moment. What I have endeavoured mainly to show in my paper is a want that I think has been very generally acknowledged for some time past, namely, that our cavalry is numerically very insufficient for the duties required of it. I am well aware that my paper is in many respects imperfect. In attempting to deal with a very difficult question, I have merely endeavoured to suggest a way out of an obvious difficulty, and prefer to leave it to Officers of larger experience than myself to comment upon my effort. I do not suppose that my suggestions are in any sense perfect ; I merely plead they may be considered as an attempt to deal in a practical manner with a very pressing question. I am accused of tampering with the regimental system. No one appreciates our regimental system more than I do. The efficiency of the Army owes everything to our regimental system, and the mounted infantry detachments, distinguished as they have been in recent campaigns, owe their reputation and success entirely to the regimental system which exists in the regiments from which they come. I perfectly agree with my friend Major Napier, and Sir James Hills-Johnes, that cavalry can do all mounted duties far better than the best of mounted infantry. But the question is, have we sufficient cavalry to perform such duties, and further, can we afford to sacrifice a certain amount of their efficiency in teaching them to act as infantry, or is it better that they should keep themselves to their rôle as cavalry, and merely learn their dismounted duty as an adjunct to their cavalry duties ? This latter question is one which I prefer to leave open. Cavalry Officers of experience have a right to give an opinion on that matter. Sir Redvers Buller led us to understand that he anticipated in future campaigns mounted infantry would play a very important part on the Continent of Europe. My suggestions

have in large measure been made with this consideration in view, namely, that we should give to a certain number of our infantry soldiers an amount of practical training. Lord Wantage and Colonel Macdonald, and other distinguished Officers of the Volunteer Force, whose opinions are extremely valuable, seem to be perfectly in accord that those mounted infantry companies which exist now might be very easily maintained, and that they are consonant with the sporting instincts of Englishmen, and with the military feeling of the Volunteer Forces generally. I have endeavoured to point out that unless some central school of instruction be established, at which Officers and non-commissioned officers and a proportion of the men can be put through a course of instruction, the mounted infantry companies or battalions can never attain to a real and practical efficiency. There must be one universal system of drill and interior economy. I know in one case particularly, that in Lord Mount-Edgecumbe's company it has been found a most pressing difficulty to obtain any sort of instructor for the men. What I would urge therefore for the Volunteer Force is that some such school as that suggested should be called into existence at Aldershot. At that school non-commissioned officers from the regular troops would go through the course that I have indicated, and these non-commissioned officers passing eventually into the reserve would form exactly the class of instructor a Volunteer Officer would wish. Without assistance of that kind the mounted infantry companies would die a natural death. Sir Lumley Graham has rather misunderstood what I said about discipline. I never intended to infer that in the recent campaigns the discipline had been bad, but I do maintain that our fire discipline is defective, and this, I think, is the opinion of the very large majority of regimental Officers. In my remarks about discipline I have stated that the tendency of the present day in the Army and elsewhere is to relax the law of discipline, and we should bear this liability and this feeling in mind in dealing with all matters of military organization, such as a *corps d'élite* of the kind I have attempted to describe. Colonel Edwards, Colonel Church, and other Officers of the Volunteer Force have endorsed my views as to the necessity of forming a mounted infantry brigade in cases of emergency, and they have testified to the fact that among the Volunteers there are a great number of men who would be perfectly ready to come forward and offer their services in any part of the world where they might be required. In reply to Colonel Macdonald, I did not mean to imply that the men should be enrolled now; the Mounted Infantry Volunteer Brigade scheme would merely be called into existence when a national emergency arose. I wish in conclusion to express my thanks to Mr. Caton Woodville, who has painted expressly for this occasion this very able picture. It is a mounted infantry soldier, and has been extremely carefully painted, and every portion of the equipment and detail has been worked out accurately, according to the latest mounted infantry regulations.

Colonel MACDONALD: Will you say anything about the double mount for each horse?

Major HUTTON: I have purposely not entered into any question of detail in this lecture. I have attempted merely to deal with the question of mounted infantry broadly. The details connected with my scheme are so numerous, that it would be almost impossible to touch upon them.

The CHAIRMAN: I am sure at this late hour of the evening, after all the very interesting speeches you have heard, you do not all wish me to go over the ground which has been traversed so well by many of those who have just spoken; but the subject is one of such intense interest, it is one that opens out not only matters of detail to which reference has just been made, but also some very broad principles, that I hope you will bear with me if I say a few words upon the general topic. I think there is one point in which every one in the English Army, certainly every one who has had much experience in recent wars, are perfectly agreed, and that is that mounted infantry as a force in the field is of incalculable value. I think it is only men who have had really practical and actual experience in the field, and under fire with troops, who can appreciate the real value of mounted infantry; but at the same time I think we must not wander away from the idea of mounted infantry and confuse that force with cavalry. My idea of cavalry and of mounted infantry is, that they are almost two distinct arms of the Service,

or, at least, they ought to be so ; although the mounted infantry man rides a horse or a camel, he is far more allied both by name and certainly by his duties to the infantry than he can be to the cavalry soldier. I will at once dispose of the idea with reference to cavalry soldiers doing the work of mounted infantry, in my own mind at least and with arguments that commend themselves to me, by adopting what has been said by several of the speakers, that a cavalry regiment if armed with a long rifle would be far better qualified to perform the duties which are now done by mounted infantry than any body of mounted infantry I have ever seen put in the field. But then our cavalry are not armed with the long rifle, and there are, I think, other reasons why our cavalry should not, if possible, be used as mounted infantry. I think I may say what my views are on this question. I look upon our cavalry as the first cavalry in the world ; there is no cavalry that I have ever seen to be compared to them either as regards men, horses, equipment, or instruction. As pure cavalry they have always shown in the field what they were worth. We can always depend upon them to perform their duties in a manner that no other cavalry can excel. But having so small a force as we have of this very highly organized, highly trained cavalry, I think it would be just as sensible to devote them to mounted infantry work as it would be to employ a Nasmyth hammer to break walnuts. It is not only a question of cheapness but of expediency. We can furnish the men for mounted infantry either from the line, militia, or Volunteers. The first time I saw a large force of mounted infantry in the field it was not counted by companies or by hundreds, but by thousands ; that was in America. I there saw the largest force of mounted infantry ever put into the field. They were nominally called cavalry by those who did not know what cavalry were, but they were purely and simply infantry in every way, and armed and drilled as infantry. They had the locomotive power, or a certain amount of the locomotive power of cavalry ; the most distinguished of all their leaders was an infantry Officer, General Sheridan. That force of mounted infantry, made such good use of in the American War, was improvised in a very short time, and I am quite sure what was done in America from 1862 to 1865 could be as well done in this country, where there are such numbers of men who, having left our Army, have carried away from it much very useful information upon all military subjects. An appeal properly made to these men would bring most of them back to our ranks in any emergency, and our authorities would find without difficulty amongst the Volunteer Forces and the militia, and the various men who have passed through those services, enough men to form a division of mounted infantry that would in every way be quite equal to that which I saw in America, and which did such gallant and magnificent service during the Southern struggle for independence. Then, again, we are told the cavalry soldier ought to be as good on foot as the infantry soldier is. I do not believe in the jack-of-all-trades ; I think he is a myth. I believe the cavalry soldier ought to be taught to fight on foot when it becomes necessary to make him do so, but in my opinion to make him do so except in an emergency is a waste of power. The Germans teach their cavalry to fight dismounted and to do dismounted duties. I have never served with German cavalry in the field, but I have attended their manœuvres and watched most carefully the large force of cavalry employed. I can conscientiously say that during the seven or eight days the manœuvres lasted I saw only two squadrons fight dismounted. So much as to the extent to which they employ their cavalry as mounted infantry during their annual manœuvres, and, I think, if you inquire into the history of recent German wars, it will be found that the numbers of times the German cavalry were dismounted and used as infantry were very few indeed. They were used for purely cavalry purposes, that is occasionally for magnificent cavalry charges, their great rôle, however, being to obtain information of the enemy's doings and intentions, and to form a screen for their own army for the purpose of keeping at a distance all prying scouts, and to prevent the enemy from finding out what they were about. That is what I have to say as to the use made of the German cavalry during recent years. I cannot possibly pass over in silence a statement made by Sir Lumley Graham, who spoke of the discipline of the corps lately employed in Egypt as being bad. In reply to it I can only say that as regards my own experience in the Army, and on active service, I have never served nor heard of any Army, large or

small, in which there was less crime, and in which the men behaved better in every way in which soldiers can be tested in the field, than the men with whom I was associated, not only in 1882 but also in 1884 and 1885 in Egypt.

Sir LUMLEY GRAHAM: I did not assert myself that the discipline was bad. I quoted the lecturer, as I understood him to imply the discipline was bad. I said, on the contrary, I hoped it was not the case.

The CHAIRMAN: I am very glad to hear that, because it certainly was not the case, and the lecturer or any Officer who was present in Egypt on either of the occasions to which I refer will bear me out in what I say. With regard to mounted infantry generally, we do not want them as a substitute for cavalry; we want them to help it. My own notion is, that in the future, if we look forward to a war—and we may have it at any time forced upon us—the army that will have with it in the field a large mounted infantry force, whether that force be mounted upon donkeys, camels, elephants, or any means by which they can get about quickly from one place to another, and will have with it a sufficient ingredient of regular cavalry to act purely as cavalry, to charge when necessary, that will also have with it some light guns and especially machine-guns, the army possessing such a force, and whose leaders know how to use and to handle it, will have an enormous advantage over an army that adheres exclusively to the stereotyped employment of cavalry, infantry, and artillery. There has been a great deal said about how these mounted infantry should not be formed, and during the discussion we have heard a great deal about regimental discipline and regimental *esprit de corps*. I am sure it is like painting the lily in addressing this or any audience of English soldiers to dilate upon the importance of regimental spirit in an army. Any man who has ever served in any army, especially in ours, is well aware how absolutely necessary it is to keep our army together, in fact it goes without saying. I cannot, however, think that those appreciate this feeling properly, or have taken a right view of it, who say that if you take away 50 or 60 men from a battalion of 600, or 800, or 1,000 men, you utterly destroy that battalion, or that taking away from a battalion, as one speaker said, two Officers, who afterwards distinguished themselves and won the Victoria Cross, was to destroy the efficiency of that corps. All I can say is, I hold our regimental spirit in much higher estimation than to imagine that taking away even the two very best Officers, even supposing them to be a real Wellington and Napoleon, would destroy any British battalion I have ever known. We have plenty of good regimental Officers, and there is no battalion in the Army that could not spare two or more Officers for mounted infantry work, and spare them well. We have been told during the discussion how we must not get these mounted infantry together, but we have not had, as far as I can remember, one single practical proposal as to how a large force of mounted infantry could be collected together. We have certainly had it proposed to mount a complete battalion on horses. Any one who knows how our battalions are composed will recognize the difficulty of doing this, and any Officer of experience with mounted infantry in the field will tell you that it would be impossible to expect from any such corps all that we are accustomed to get from mounted infantry. You could not get the same amount of work out of a battalion of ordinary infantry that you would get out of two-thirds the number of selected men. I do not know of any more practical plan for creating a corps of mounted infantry when required than that which has been proposed by the lecturer, namely, to establish at home a good school for mounted infantry. The larger the number of Officers and men sent through such a school, the more easily would a battalion of mounted infantry be raised when the necessity for it arrived. I believe that in the future, as in the past, we shall always be obliged to raise it by drawing so many good and selected men from each of the battalions it is not intended to send into the field. I hope that whenever this is done the battalions left behind will, for the reputation of the regiment, if for no higher motive, take care to send their very best men. Each small knot of men thus supplied will go into the field under own immediate Officers, each carrying with it the traditions of its own regiment or battalion, and proud to show the Army it is serving with, the stamp of men that regiment is composed of. Thus a regiment, although not actually in the field itself, although it may be at home in quiet garrison, yet has its feelings and its traditions well represented in the war by men of whom that regiment may well

be proud. Now, gentlemen, I have nothing more to do than to convey to the lecturer, as I am sure I am justified in doing, the thanks of everyone present this afternoon for having brought this subject so ably and clearly before us, and I would also tender our best thanks to those who have taken part in our interesting discussion.

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Friday, June 4, 1886.

LIEUT.-GENERAL SIR FREDERICK FITZWYGRAM, BART., M.P.,
in the Chair.

A RESERVE OF HORSES.

By Colonel F. G. RAVENHILL, R.A., &c., &c.

ONE of the most widely accepted principles in the requirements of modern war is the necessity for a rapid mobilization of all arms.

In this country, we have our regiments, batteries, and troops of the 1st Army Corps, the establishments of which are kept up, to a certain extent, in a matured state of preparation for active service.

Then we have the troops forming the 2nd Army Corps, for which certain defined establishments are laid down, with a third section of our forces belonging to no particular army corps, which are on the lowest scale so far as their strength goes.

As regards the personnel of the Army, we have our dépôts for men with reserve forces, and to supplement these an organized Militia and Yeomanry, with thousands of Volunteer artillery, engineers, and infantry, certain medical staff and hospital corps.

To supply material we have our arsenals, magazines, dépôts, and stores for arms, ammunition, camp equipment, and clothing, with a highly trained though numerically small Ordnance Store and Army Service Corps for their issue.

But with regard to any reserve of horses—or even procuring the same—there is no provision, and our organization under that head is altogether deficient; for though an impress of carriages and horses is sanctioned for the transport of baggage, &c., by the Army Act of 1881, no machinery exists for its application.

Hitherto we have blindly calculated on our own country being able to furnish us with horses in time of need—but even in peace-time these resources fall altogether short of the ordinary commercial requirements, as shown by the Board of Trade Returns, from which it appears that, exclusive of Ireland, in the past decades our imports and exports of horses have been as follows:—

		Imports.	Exports.
From 1876 to 1885 inclusive	....	177,058	51,127
„ 1866 „ 1875	„	80,603	41,264
„ 1856 „ 1865	„	20,829	34,539

The Returns only give the five years previous to 1856—

From 1851 to 1855 inclusive	21,936	11,875
Then for the year 1851	3,443	1,526
„ 1841	339	4,538
„ 1831	1,063	718

The greater part of these importations have been from foreign countries, whereas if once the trade were properly developed with our Colonies much of that supply might come from our own Colonial stock.

I have had reason to think that Ireland has been falling short in its supply, and learn that during the year 1885 there were no less than 2,487 horses imported into that country, showing that even there the supply does not equal the requirements—it is true that the exportations have been very large, reaching to almost 25,000 during each of the last two years.

The consequence has been that when a sudden demand for horses has set in, we have been at our wits' end to know where to find them suitable for war purposes, and have had to take any supplies procurable.

On reference to the latest War Office Returns it appears that the number of horses required to complete the full establishment of regiments of cavalry, batteries of artillery, engineer troops, infantry, and general transport of—

The 1st Army Corps is 11,483 exclusive of 1,571 Officers.		
The 2nd Army Corps 11,483	„	1,571 „
Or a total for two		
Corps d'Armées .. 22,966	„	3,142 „

The number of horses in the possession of Government for this financial year, exclusive of those in India, is shown as 14,151; but from this must be deducted 1,200 employed at other stations abroad, reducing the number at home to 12,951 horses.

From this last number must be deducted those too young, too old, also the sick and lame, or allow 20 per cent., say 2,580

Leaving a total effective of 10,371 only,

or about 1,100 horses under the number required for one army corps, and 12,600 for two, exclusive of Officers' horses.

Where lines of communication have to be maintained 2,773 additional horses are required for each army corps, making a total deficiency for the two of 18,100.

For the completion of only two army corps with their lines of communication there is a deficiency, as shown, of 18,100 horses; and in addition there should be a reserve to feed the waste of one campaign, 40 to 50 per cent., or say 9,000 more: in the Crimea our waste amounted to 80 per cent. per annum.

The men for one army corps could be mobilized in three weeks;

but it would take a much longer time to procure the horses necessary to complete even that one small fighting body.

In 1882 it took seventeen weeks to procure 1,700 horses, which was below the numbers required to complete the establishments.

At the same rate it would take 170 weeks to complete the establishment of horses for two army corps—and we should still have to provide for the remaining requirements.

It is true that delays arose in the arrangements, which may not recur in the future, but in the absence of any well-matured organization the purchasing of suitable horses in any numbers must necessarily occupy a considerable period.

By the latest Census Returns it is shown that there is a total of horses in—

Great Britain and Ireland of	3 millions.
Of which there are employed in agriculture ..	2 „
And privately or in trade about	1 „

After deducting those too young or too old, the too small, too big, and those unsound or otherwise unfit, there would be only 70,000 horses available; in this number are included the high-fed London carriage horse and the well-stalled hunter. Could they be purchased, or, if they could, are they suitable to the exposure of active service? My calculations reduce the number to less than the 70,000.

To admit of rapid concentration some well worked out scheme of supply is essential for success, and in considering the question it must be remembered that horses to go on a campaign should be seasoned, if not duly trained in a military sense.

If our cavalry is to scout and outflank an enemy, or our horse artillery is to be capable of making forced marches and rapidly moving to the front to hold positions in support, we require a body of horses available which are full of keep and muscle—with heart for their work, as we cannot expect green, fat, unformed animals direct from the graziers or dealers to be able to make long marches or gallop to the front with our telegraph wagons and signalling parties. This opinion of the necessity existing for seasoned horses where hard work is required of them is supported by the experience of the largest employers in the kingdom to whom I have referred; and even for their steady work a period of preparation is found necessary.

Some of the leading jobmasters.....	say 2 months.
„ „ cab-owners	„ 2½ „
„ „ omnibus companies	„ 1½ to 2 months.
„ „ railway „ ..	„ 3 months.
„ „ carriers	„ 2 to 3 months.
„ „ experienced veterinary surgeons.....	„ 3 to 6 months.

Our great want in war has always been that of riding and horse artillery horses, a certain number of ordinary draught and pack horses, with other beasts of burden, have been procurable. That

Wellington was in constant want of horses is evidenced by his despatches, the following extracts illustrating this :—

Wellington to Lord Castlereagh, 22/6/1809.

“I hope you will send the remount horses soon. I have given to the 14th and 10th Light Dragoons 95 horses from the Irish Commissariat, and believe I shall give some to the other regiments. This arrangement and the draft from the 3rd Hussars will keep up the regiments for a short time ; but it is inconceivable how fast the horses of both cavalry and artillery fall off.”

Wellington to Lord Castlereagh, 27/6/1809.

“The brigade of heavy cavalry, which has not yet done a day's duty, is obliged to leave here nearly 100 horses, and the brigade which has been to the northward is so much reduced that they are happy to take 110 horses of the Irish Commissariat. I hope, therefore, you will send us the remounts as soon as you can.”

Wellington to Lord Castlereagh, 25/8/1809.

“The English have about 2,500 cavalry left. I shall be very glad if you will send us the remount horses, and any regiment of dragoons that is to come, as soon as possible ; the best thing to do then, probably, would be to draft the horses of one of the regiments to complete the others, and send that regiment home dismounted. It would be very desirable also to send us 600 or 700 sets of horse appointments.”

Wellington to Lord Liverpool, 5/2/1811.

“Recommends Government should buy 50 to 60 horses at from 40*l.* to 50*l.* a-piece for Officers to purchase. If they went into the ranks the only loss would be the difference between 40*l.* and 30 guineas—the ordinary price.”

Returns Nos. 1 and 2 enclosed with Despatch to the Duke of York, 10/2/1813.

5,175 horses present, 1,070 deficient ; the 4th Dragoon Guards, 9th Light Dragoons, 13th Light Dragoons drafted home, so as to reduce men to 5,119 (from 6,245).

Hitherto when an emergency has arisen, we have had to supplement our island resources with Spanish, Barbs, Syrians, Flemish, and Colonial horses. All will remember in the Crimea what a large proportion of our riding horses were foreigners, with an inconceivable number of mules in draught, which are but poor substitutes for our home-bred horses, and if they had had to do any continuous marching, would have hopelessly broken down.

Foreign nations have foreseen these deficiencies, and have their Officers and cavalry mounted on Irish and English horses, and are

we to be exposed to meet these well-mounted troops under disadvantageous circumstances on small Asiatic stock? for in a charge, weight combined with blood will tell.

The great foreign Powers have always a certain surplus of horses in hand during times of peace, which, on the outbreak of war, are drafted from the Service into reserve squadrons. Why should not we partially adopt some such arrangement?

Gentlemen, the great struggle which took place on the Rhine in 1870 between France and Germany demonstrated the effect of the most perfect organization and preparation, and the want of it; the result of the latter was attended with overwhelming defeat and humiliation.

Is Britain to lay at the conqueror's feet for want of preparation and forethought? Is it conceivable that we should be given several weeks to provide horses for one Army Corps, a work which ought to be done in a few days? Now is the time to form and complete the requisite organization—now is the time to prevent disaster!

The question then presents itself, where and how are we to maintain or procure the necessary number of horses?

(1.) Government could increase the number in each regiment and battery, say 20 per cent., which would insure the establishments of the few corps kept up to 1st Army Corps strength being efficient; this would entail the maintenance of 2,300 horses more than we have at present. I am informed that the cost would be about 24*l.* per head per annum, or 55,200*l.* for the whole, to which must be added the original cost of the horses, say 98,550*l.*, being a total of 153,750*l.* for the first year; in subsequent years the cost would amount to 69,300*l.*, including 5,520*l.* for the keep and 14,100*l.* for the purchase of renewals. This does not include cost of extra stabling, pay and clothing &c., of extra men, which would be considerable.

(2.) We might have dépôts where young stock, purchased at from two to three years of age, might be reared, thereby enabling the breeders to realize their money earlier; but this would not insure a supply of seasoned horses, and would entail considerable outlay and a costly maintenance.

(3.) A proposal has been made by one or two Officers, who have thought the matter out, to form a reserve by passing horses through the ranks of the mounted branches on a short service system, selling all such as are over ten years of age, but registering and holding a lien on them up to fourteen or fifteen, thus being able to take them back at a price to be fixed on a decreasing ratio according to their age. Such a system would entail the outlay of much money, and would have a tendency to impair the efficiency of the mounted troops through the loss of their horses whilst still in their prime.

(4.) A further idea, somewhat the same as the last, only not so wholesale, is to sell out from the Service all mares over ten, holding a claim on them; but as these mares would obviously be used for breeding purposes, they could not be considered available or fitted for active service, and the same objections as given by me in the last case would hold good in this.

(5.) It has been proposed by some to give a subsidy to such of our Yeomanry as may be willing to receive it, for allowing their horses to be called up when required on the condition that they provide for themselves other efficient troopers within a given time.

Objections to this may be urged, that many of the horses the Yeomanry are mounted on are said not to be their own; if such is the case, it is a matter for correction.

It is also thought that you would be taking the horses of the Yeomanry just at the time when their emergent services might be required.

(6.) It may be urged that the Army Act of 1881, sect. 115, previously referred to, affords the opportunity of impressing, in case of an emergency, every description of conveyance and of horse, whether it be kept for saddle or draught; but it is not clear to me how the law stands, as to whether the purchase or only a hiring is contemplated; and whether the conveyances and horses could be used out of the United Kingdom; so far as I can learn, no registration of available carriages is kept up at police stations, no provision is made for the purchase of the same; and it is to insure some measure of this kind being adopted that I am addressing you to-day.

(7.) Another scheme is to register every horse plying for public hire in the United Kingdom, for which we partially have the machinery in the hands of local authorities, as the owner of every public vehicle has to procure a licence; and whilst this is being done, the horse might be inspected, and, if found fit, classified, the proprietor being subsidized annually; if his animal is at any time required by the State, the full value at that time to be given for it; in case of dispute arising, the price to be settled by arbitration. There are objections to this, as it would fall on one class of people. The number of horses thus obtainable would be limited and would not be very serviceable.

(8.) Colonel Keith Fraser, in an article on Army horses in the "Fortnightly Review" of October, 1884, suggested that some system of registration should be adopted for every horse or pony offered and suitable for military work. For this purpose and to meet the necessary outlay, it is suggested that the horse-tax, as it existed up to 1874, might be re-established; the money thus levied, which then amounted to 450,000*l.* a-year, would more than cover the estimated cost of registration, subsidizing brood stock, and a considerable balance would remain available for the Treasury. Under the Act proposed all horses registered for sale to Government should be exempted; if found necessary, a small additional subsidy might be given. The value of the horse at the time of registration would be recorded. Should this amount appear to the Government Inspector to be excessive when the horse is required to be purchased, the amount to be paid would have to be determined by arbitration, in the event of his not being able to come to terms with the owner. Objections may be made by the revenue officials to this class of tax, on account of its many exemptions, but I may instance the existing dog-tax as one having such.

Returns of horse-owners claiming exemptions would be forwarded by tax collectors to the District Government Inspectors, who would take periodically an opportunity of arranging to see the horses and judge of their capacities for registration.

No unsound stallion or mare, nor such as are quite unfitted from hereditary causes to breed a troop horse, should be exempted from paying the tax. On the other hand, every stallion or mare that is made use of for breeding purposes of good hardy colours, of a certain age and standard, and which are, in the opinion of the inspectors, fitted for getting troop horses, should be subsidized with a considerable annual premium.

Good mares are becoming very scarce, and proposals have been made to tax them when exported; but if a Government subsidy were given annually to such as are kept for brood, it might keep them in the country and do much to re-establish the breeding of good horses at home, a branch of national industry now rapidly declining.

Some may say that the amount required will be so large no Government could entertain it, but I would not propose to subsidize the fat, sleek mare of 15·3, running in a London brougham, or the good 15·3 huntress still carrying fourteen stone across country, until such are made use of and are still fitted for throwing a suitable foal; indeed should either have foals at foot, or the owners be in possession of a "service" certificate.

If 10*l.* a-year were given for each good suitable mare, I fear we should not at first register 1,000; this would be done at the comparatively small outlay of 10,000*l.*; premiums varying from 100*l.* a-year to 30*l.* might advantageously be presented to the owners of all suitable stallions, the larger premium being given to the best and largest T. B. stock, adapted for getting a hunter class of horse, on a descending scale down to the pony stallion fitted to improve the breed of baggage ponies. If we found 200 such stallions in the country, whose owners would be willing for them to serve at a small fee, and which have been serving as such for the preceding twelve months, it would be as many as we should find good and suitable. This could be done at an expenditure of 20,000*l.*, or a total cost of 30,000*l.* a-year to improve the breeding of the all-round useful horse required for military purposes.

The animals for which exemption might be claimed at the time of paying the tax would have to be submitted for inspection, and if found fit a refund order would be furnished.

Many Officers on half-pay, excellent judges of horses, with retired army veterinary surgeons, might be found all over the country, who, on receiving extra pay and their travelling expenses, could perform the duties. Fifty such groups of inspectors might be necessary, as many horses would be submitted for inspection, and large numbers found unfit. This might be done at a cost of, say, 60,000*l.*, with the expenses of two deputy inspectors, one for the north, including Scotland, and one for the south of England, to include Ireland, an Inspector-General with his staff, say, 33,000*l.*, or a total of 80,000*l.*

We should require at least 33,000 horses to be registered to obtain

23,000 effectives for two Army Corps; allowing 1*l*. each for remission of tax and a subsidy, the cost of this would be 33,000*l*., or a total of, say, 113,000*l*.

If 30,000*l*. were expended annually in premiums for suitable stallions and mares, it is considered that for 143,000*l*. this feasible scheme might be carried out, whilst the horse-tax if renewed should bring in, as it previously did, 450,000*l*.

Arrangements for the breeding subsidy might, if desirable, be placed at the disposal of the Royal Agricultural, the Caledonian, the Hibernian, or other kindred Societies.

The large repositories all over the United Kingdom, being more or less public places, present the space and means for concentrating the horses when purchased, the accommodation being paid for at market rates, thus avoiding any clashing with other Government arrangements in barracks. The animals, which would be classified at the time of registration, would be sent off as soon as possible by rail to their different depôts.

Every horse-owner when summoned to the rendezvous would have to deliver his animal safe at the repository centre.

Thus out of all the hack-horses and ponies at a place like Weymouth say, perhaps half a score of riding, a score of draught horses, and a score of baggage ponies, might be found suitable for the Service; on their being delivered by their owners and purchased, their general numbers would be branded, their description taken, and they would be forwarded—

Artillery to Woolwich.	
Cavalry and	} to Aldershot.
Transport. .	
Engineers to Chatham, &c.	

Before concluding this address may I be permitted to diverge slightly from my subject—"A Reserve of Horses"—to the general question of "the Supply of Army Horses," which was ably put before you last year in this Institution by Colonel Russell? I regret that my duties on that occasion prevented my taking part in the discussion that ensued. I can bear testimony to the fact that the difficulties of procuring a supply of suitable horses for the Service as urged then are very great, and, in place of diminishing, are annually increasing; there is the gravest difficulty surrounding the subject as it at present stands, our whole military operations, as I have already pointed out, would be delayed, crippled, and paralyzed in case of war for the want of efficient horses.

This want was prominently brought before the nation by Wellington; the same cause almost brought on us a national disaster in the Crimea. Lord Rosebery's Committee of the House of Lords in 1873, after a careful investigation, urged the Government of the day to take some steps in the matter.

The subject was again prominently brought to the notice of the public by Colonel Keith Fraser in an able article in the "Fortnightly Review" for October, 1884. He said then, "It is evident that by

taking every available Government animal it would be barely possible to supply a sufficiency of horses for the cavalry of one such corps," and he added, "there is no reserve of horses."

The insufficiency of our cavalry when ordered to Egypt in 1882 was also prominently brought to notice by Colonel Fraser in the same article, and I may here remark that to complete the small force of artillery then sent out we had to deplete of their serviceable horses almost every battery left at home, whether of horse or field artillery.

Thirteen years since Colonel Valentine Baker, in a lecture delivered in this Institution, urged an increase of horses, and asked for the establishment of a system of reserves to be readily drawn upon if wanted.

In 1884 the late Inspector-General of Cavalry, Sir Frederick Fitz-Wygram, Bart., brought the subject before the House of Commons. He urged an increase in the number of squadrons to each cavalry regiment, and a slight increase in horses has been made.

The present Commander-in-Chief in India, Sir F. Roberts, Bart., drew attention last autumn to the great dearth of army horses.

Supported by the weight of these authorities, it is to be hoped the Government and the country may now take up the whole question. The tax proposed would fall on those who use horses chiefly for their recreation; as a result of such taxation the breed of horses should improve and numbers increase, and the taxpayer would thus indirectly become a gainer, whilst the establishment of horses for army purposes would be placed on a satisfactory footing.

Procuring sufficient men and for keeping up our front line is a simple question of money, so also ammunition, guns, and other supplies are speedily turned out by the aid of machinery, but a sufficient supply of horses is not now procurable, and until a horse is five years old he is not fit for the Service.

I cannot too strongly urge the early initiation of some such system of registration as the one I have brought forward.

If it were at once adopted it would be several years before our own country could supply the requisite numbers. In the meantime, if it is to be placed in anything like a proper state of defence we must look to our Colonies, tap and try their resources, and obtain what we can from them.

A Reserve of Horses.

Renewal of horse-tax should yield annually.....	£450,000
Cost of reserve registration and work annually ..	£80,000
Remission of tax and small subsidy on reserve horses annually.....	33,000
Remission of tax and good subsidy for breeding stock annually	30,000
	<hr/>
	£143,000 143,000
	<hr/>
A reserve would be formed, and horse breeding placed on a sound footing, and the Treasury would gain annually.....	£307,000

General Sir C. P. BEAUCHAMP WALKER, K.C.B.: Having read yesterday a copy of Colonel Ravenhill's lecture with very great interest, I turned up this morning the rough notes of a somewhat long Report which I wrote to Lord Rosebery's Committee in 1873, and which I prepared with great care after communication with the Inspector-General of Remounts in Berlin, and with the Civil Statistical Departments which have a special branch for the subject of horses. Before advertg to the few notes I took from that Report I would remark that, as regards the import and export, I was told by Herr Metzel, who was then the Chef de Bureau of the Inspector-General of Remounts, that a very large number of the horses exported from England to Germany were German horses which had been sent to England and brought back and sold in Germany. He assured me the number was very appreciable. As regards No. 3 of certain proposals which Colonel Ravenhill mentions, I may state that this system prevailed in Hanover, that of short service of horses, and it was found to answer very badly, they came back almost entirely unfit for use. Another point on which I would remark is the fact that very few of our agricultural horses would be of the slightest use for artillery purposes, they are too heavy and clumsy, whereas in Prussia particularly, where the soil is much lighter than that of England, and a much better bred class of horse is used for all purposes, there is no difficulty whatever in taking teams from the plough and putting them into the ranks. I particularly remember at the great parade which took place in Berlin of the Artillery of the Guard before the commencement of the war of 1866, the then General Officer commanding the Guard pointed out to me that three-fifths of the horses had six weeks previously been at the plough, and all I can say is the whole ninety guns marched past and only one horse kicked over the traces. In that country the horses are driven for agricultural purposes in exactly the same manner as they are in the artillery, namely, on the pole, and there is not the slightest difficulty in adapting them to the purpose if required. I thought in looking over my notes perhaps a few points might be valuable here. There are six ways in which in Prussia in 1873 the breeding of horses was encouraged; first by the establishment of three principal breeding studs, viz.: at Trakehnen, in East Prussia, at Neustadt, in the Mark Brandenburg, and at Gradlitz. These were originally established for the purpose of supplying horses to the Royal stables, but since that time they have been very much devoted to the production of stallions for breeding. The second point is the establishment of county studs, I think twelve or thirteen dépôts for stallions, which at stated periods of the year make their round, and return again to their dépôts after the work has been done. The third is that prizes are given for approved stallions, the property of private persons. The fourth, that loans without interest have been made to private associations for the purchase of stallions. The fifth that prizes are given at race meetings—I conclude on the same principles as our Queen's Plates; and the sixth by money grants to parishes for the maintenance of pasture lands for young horses. This is a very small sum, indeed, in fact it only amounts to about 150*l.* a-year. We probably all know that the system in Germany is to buy horses at over three years of age, to let them go to the stud dépôt where they remain at least a year, if not sixteen months, where they are carefully looked after and tended, and are then sent to their regiments, and no horse really enters into the squadron till he is five years old; in the Guards it must be as much as five and a-half years. The remounts at the time I speak of cost the State about 28*l.* The annual waste allowed is one-ninth of the troop horses and one-fifth of the Officers' horses. But by far the most important part of Colonel Ravenhill's lecture is the manner in which he has adverted to the registration of horses which is most carefully carried out in Germany, and was during the whole time of my long service there an object of great admiration, because I had two opportunities of seeing how very quickly a great army could be mobilized under that system. All horses in the country were registered, the only exceptions being the horses of the members of the reigning German houses, the horses of foreign embassies and legations, Government officials who keep horses for public service, and the contractors for the Post Office. There is no great injustice committed by it because everybody is under the same condemnation. The horses are taken at a very fair price, very much commensurate with their real value, and no horses are

taken which it can be proved are of such exceptional value that it would entail a great disadvantage on the owner if they were taken from him. I think some system of the kind might very well be introduced in England, and I hope the lecture we have now listened to may have the effect of drawing attention to the question.

Colonel KINGSCOTE: I had not the pleasure of reading Colonel Ravenhill's lecture but only of hearing it, and I did not quite gather from him at what age the horses were to be reserved, whether at two or three years old, whether they were to come into Government hands first, or at what period of their life they were to be reserved. I do not know whether he will kindly tell me what his idea is upon that. As regards a reserve of horses, there is no doubt it would be a most advantageous thing if it could be done efficiently for the Service, but I am afraid there are very great difficulties in the way of reserving horses, and that when they were wanted they would not be forthcoming in the way we could wish. Giving a subsidy, so much on each horse, might help, but I cannot think that that would bring you any very efficient service, that they would not be fit to put into harness for artillery purposes. Certainly if they were worked in omnibuses and such conveyances you might get them, but then the public would cry out and want their omnibuses just the same whether we were at war or whether we were not. I think the first thing we want is to breed the horses; that is the thing we require, and to which I should really like to see Government aid given. I think that by a comparatively small subsidy very much assistance might be rendered in that way. I should like to see adopted what in a minor way I am glad to think the Royal Agricultural Society is going to undertake, namely, to give prizes for stallions to cover at low prices, the prizes given being 200*l.* a-piece, so as to encourage people to buy good stallions, and to perambulate certain parts of the country covering mares at a low price. That, I think, is a step in the right direction, but then it only occurs in one part of the country where the Royal Agricultural Society is holding its show that year. We want that system all over the country. And I would go beyond that. I would give in future years prizes for mares with foals got by those stallions. You would then give an encouragement to farmers and others to breed horses, and if the money were given by the Government, you might in some way register those foals, and I do not think it would be any hardship to say the Government should have the first claim upon them between two and three years old at a certain price. I have always had an idea that that could be done, and I believe that would encourage the breeding of horses more than anything, and till we do that I am afraid that even giving subsidies and numbering horses for the reserve will not be of very much use. I think that is the right direction in which to commence. Of course as regards Colonel Ravenhill's idea of registration of reserve horses, that might be carried out more easily afterwards, but I am afraid we should be leaning upon a broken reed if we were to trust to that entirely, and not commence by trying to stimulate the breeding of horses.

Mr. GILBEY: I was unfortunately prevented from being present to hear the commencement of the lecture, but I concur with much that I have heard, also with the remarks of Colonel Kingscote. I was speaking on the subject of horse-breeding at a large meeting held in the show ground at the Royal Agricultural Show at Preston, at which Colonel Ravenhill, I believe, was present, and I was met with two or three questions, one being, "It is very well to advocate the breeding of horses, but would the prices at which the Government purchase horses ever encourage the farmer to set about the business?" I replied that the ambition of all breeders should be to produce horses that were much wanted in England, namely, superior sized animals which shall command a ready sale at remunerative prices to the breeder, and that they should be able to look to the Government as purchasers of what I may call "misfits," that is, horses not exactly fit for hunters or for carriage purposes. To my knowledge very many horses that are imported are not such as we can breed in England, but we are obliged to put up with them to meet the continual demand for carriage horses. I cannot quite follow the suggestion that has been made of a Government subsidy, but I am sure it would not meet with favour. We are much indebted to the Royal Agricultural Society for the liberal resolution which they have carried to encourage horse-breeding, they

having voted a sum of money for thoroughbred stallions, to be given at spring shows, five premiums of 200*l.* each and a gold medal. Although the Royal Society has struck a bold line in offering these five premiums, a line that was started by the Hunters Improvement Society two years ago, little good can be done in a country like England unless the example be followed by the other Agricultural Societies. I hope that before long the money now given for Queen's Plates will be devoted to the same purpose, viz., as premiums for thoroughbred stallions suitable for getting half-breeds. The other day I was reading a book, written nearly a century ago, on the breeding of horses, from which it appeared that in one division of Yorkshire alone there were over 100 thoroughbred stallions located for serving mares for breeding half-bred horses. Therefore, unless supported by the Agricultural Societies throughout the kingdom, the attempt of the two societies just mentioned will be but a small one. I am afraid I have said but very little to encourage my friend Colonel Ravenhill, than whom there is no one better qualified, from his practical experience, to make suggestions on this subject, but I will more carefully study and think over his lecture, and if I can be the means of furthering his object in any way or in increasing the number of horses to meet our requirements in England, I shall be only too pleased.

SIR THOMAS GROVE, Bart., M.P.: Sir Frederick Fitzwygram has called upon me, but I am afraid I can throw no light upon this matter. I have been for a great many years in the Wiltshire Yeomanry, and formerly I had the honour to hold a commission in the same regiment with Sir Frederick Fitzwygram. One suggestion that has been made is, I think, well worthy of consideration, viz., that if the money now paid by the country for Queen's Plates in little petty races all over the country was applied to encourage the breeding of horses, which might be available for cavalry or artillery purposes, it would be a very great advantage. These petty races in our country towns do more harm than good: they demoralize the population. Betting men come to those towns, they spend no money there, but go back after having fleeced the poor agricultural farmers, who are far from rich at the present moment. That is one suggestion which I think well worthy of attention. There is no doubt that at present we do not get horses in sufficient quantity or quality to be available for military purposes: what we have are either unsuitable for artillery purposes, or else they are weedy animals that would not be sufficiently strong to carry dragoons in the field, whose weight in marching order comes to 20 stone. Where I live we have a small society which keeps three or four well-bred stallions, the object being to get horses sufficiently strong or sufficiently well-bred to carry medium and heavy weights with hounds or dragoons, or to go into the artillery. One great difficulty is to get horses with sufficient breeding action. It is more difficult than anything in the world to get horses that are really good hacks and have good action for carriage purposes. There has been a very great falling off here; we have been in the habit of getting as stallions broken-down thoroughbred horses, which are no good for races, and which have no action and have not strength enough either to get hunters or sufficient action for good carriage horses. If we could improve that and get a better class of stallions, I am quite certain we should get a much better class of horse to carry dragoons, or to be used for artillery service. I am very sorry I cannot throw any light upon the subject, and I do not exactly know why General Sir Frederick Fitzwygram called upon me, except that I was an old friend of his and hold a commission in the Wiltshire Yeomanry as Major and Lieutenant-Colonel. We have some very good horses in that regiment, which is 400 strong, but I am afraid the price the Government now offers for cavalry remounts will not as a rule induce the yeomen to sell their four-year-olds. I know some years ago, we had much better horses, but at present we have not enough horses of sufficient quality, as the farmers find it pays better to breed cart colts, as they can earn their keep when two years old off, and a good four-year-old cart colt is worth from 40*l.* to 60*l.*

MR. JACOB WILSON: I can say with the greatest sincerity I did not come here with the smallest intention of being otherwise than a listener. This is a subject, however, in which I along with my friends Colonel Kingscote and Mr. Gilbey have for some time past taken considerable interest, and for the last eighteen months we have been sitting upon the Special Committee with reference thereto. I feel that

this is a subject which you may have to penetrate very far before you can touch the true origin of the scarcity of horses. Speaking from an agricultural point of view, it must be borne in mind that the diminution in the supply of horses has arisen in a great measure from the improvement by drainage and other processes of the grass lands of England, whereby the farmers of England were enabled to produce beef and mutton more profitably than horses. Matters, however, now are somewhat changed, and I cannot help thinking that with the increased demand for horses it may be in the interest of the farmers to direct their future attention to meeting that demand. I heard the gallant gentleman Sir Beauchamp Walker say that the cart horses of England at present would be of no service for artillery purposes. Well, with all due submission to his greater knowledge, I must submit that there is a class of light cart horse in England, especially in the north of England, of the Clydesdale cross, famous for good shoulders and very good action, and perhaps Colonel Ravenhill will bear me out that in some parts of Cumberland and the Borders such horses do exist. I know from my own experience that such mares covered by thoroughbred horses have produced very good animals, and I myself have sold a horse five years old for 300 guineas, bred from a light cart mare with very good action. What I maintain is this, that the class of mare which perhaps for agricultural purposes cannot be used for breeding Shires or Clydesdales, may with very great advantage be used for breeding something else. I am not prepared to say what. If a man does not breed a weight-carrying hunter he may breed a valuable carriage horse, and if he does not breed a carriage horse he may then have the advantage of falling back upon a supply of remounts, and I regard the supply of remounts as a very great boon indeed to the horse-breeding community of this country. So far as the Royal Agricultural Society is concerned they have, I am glad to say, recognized their responsibilities in this matter, and they feel that it is their duty to give a lead to the rest of the country, in the hope that they may be supported either by the Government or by some other outside source. It is no use waiting for the Queen's Plates money to be given us, or for the Government to make a special grant in the first instance. If the Government of the day see that there is some machinery by which this object may be carried out, they may possibly then be induced to take the matter up, but until we give them a lead I believe nothing will take place. The great object the society has in view is this, to bring into the service of the country a class of horse which at present is not seen—a horse which is a stage above the ordinary scum of the racing stable which is going about the country at this moment, disseminating that which is bad as well as that which is very little good, and also below the standard of the race-horse sire—a class of horse which generally at present is purchased for foreign Governments, and which I think it a great misfortune is allowed to leave the country. It is not for me to tell the military gentlemen present what the great advantage of registration would be. Theoretically it seems perfect, but I am bound to say it does not sound very English. We do not regard parental legislation as a rule with very great favour in this country, and I think that the same feeling would apply to the reserve of horses. I sincerely believe now as a commencement has been made which I hope may be followed up by Colonel Kingscote's suggestion of giving prizes for the produce of these valuable horses, which I believe will be purchased by special individuals for the special purpose (and even at high prices) as a good investment, that the result will be a very great improvement in the supply of horses for cavalry, artillery, and for general purposes.

The CHAIRMAN: Surgeon Lambert is with us to-day, and perhaps he can tell us something about the Irish horses, a point in which the cavalry are most concerned, because they are very good riding horses, though they have very few draught horses.

Inspecting Veterinary-Surgeon LAMBERT: I did not come prepared, Sir Frederick, to speak on the subject, but I was first in Ireland in 1859, and then we could get cavalry horses for 25*l.* and 30*l.* quite as good as they are now when the price is 40*l.* and upwards. I was associated with General Sir Drury Lowe, the present Inspector-General of Cavalry, in buying horses in the north of England in 1878, at the time of the so-called Russian scare. There we had to buy all sorts of horses, and one point that struck me, which I think has not been touched on to-day, was that

had we been able to give for the horses we required 5*l.* or 10*l.* more, we could have got at least three times the number we did. We had the same experience in Dublin in 1882, when in response to advertisements large numbers of horses were brought to the barracks, but the owners refused to sell scores and scores, just for the sake of 5*l.* which they wanted more than we could afford to give, or rather more than was the Government limit. I think in time of war or emergency, when large numbers of horses are required, it would pay the Government to give a little more money than they have hitherto done in such circumstances, and then they would get far more horses than they otherwise would.

MR. GILBEY: I omitted to mention one fact alluded to by one of the speakers, who mentioned the superior quality of the German farm horses for military purposes. I do not know whether he takes the type of the English cart horse from the horses seen at our London spring shows, which are the heaviest and the best we possess in England. Very much depends upon the soil where the horses have been bred and located; the shire horse reared upon light lands soon becomes a smaller and more active animal, possessing at the same time the good quality of bone, well-formed flat legs and sound feet. I should like to have the pleasure of showing the gentleman who doubts the activity of our shire horses, two animals that I keep in the country for station and carriage work. It may be thought strange that I should use cart horses for that purpose, but I prefer them to the foreign horse, which is only too frequently soft and unfit for quick work, for they can do with the greatest ease nine or ten miles an hour, and that day after day. There are many hundreds of light mares in the country of precisely the same type, and what I maintain is—I have expressed these views in a short pamphlet on the subject—that if these mares are carefully selected and mated with a good sound thoroughbred horse, they will produce the class of riding and driving animals so much wanted in this country.

Colonel PHILIPS, h.p. 4th Hussars: I can support what the lecturer has said with regard to the scarcity of horses, for having had the command of a regiment for the last four years I find we are utterly unable to get horses over three years old, and consequently the country is put to the expense of those horses being fostered and kept in our stables with all the risk and chances of their not maturing. I know from talking to farmers and asking them why they do not breed horses that we can buy, the same answer has always been given to me that it does not pay them at the price that we give. When we sent two cavalry regiments to Egypt in 1882 nearly all the other regiments were unhorsed. I know I gave 100 horses myself and, taking my remounts, the result was I had about 150 left for parade. I had to buy remounts, and I suppose for every two four-year olds that I bought I had to buy 28 three-year olds, and although we did not buy the three-year olds until October, still they were fit for nothing until the following spring. If any of our regiments were ordered into the field we should find to bring them up to a war footing that we required at once 200 or 300 horses, and they are not to be got. I was on the Central London Committee in 1882 with Colonel Ravenhill and Sir Frederick Fitzwygram, and I know that although we were giving 50*l.* or 60*l.* we could not buy 100 horses. The figures that have been given to us to-day show that the horses are not to be got in the country, and I doubt whether except by compulsion you could buy them at all. Of course if all the horses were registered, we might know that we had them in England, but still as no one keeps extra horses, people would not like to part with them even if they were paid 100*l.*, and if you give only 40*l.* or 50*l.* the horses simply would not exist. I know that the whole time that I have commanded a regiment I have had to buy three-year olds and to make the best I could of them. I therefore entirely support what the lecturer has said as to the scarcity of horses.

Lieutenant-Colonel INGE, late 6th Dragoons: I came here, Sir Frederick, for information, but as you have been good enough to ask me to give my opinion I may say that I think the registration of horses would be a very difficult thing to carry out in this country, for the reason that the people whose horses you would register would be a class of people who would always be changing horses, so that you would never be able to get at them. As a matter of horse-breeding in this country the great thing is to prevent the foreigners coming over and buying all our good mares. As I am in the habit of attending most of the fairs in England it seems to me that

there are plenty of horses to be bought, if the Government would pay the price for them, but the great thing is to prevent the foreigners, Messrs. Oppenheim and others whom I could mention, who come over and buy every mare and give a good price for them and so tempt the farmers to send them out of the country. I have a friend on my right, Mr. Martin, who has a large rancho and a quantity of American horses, and who I daresay would be able to give you more information than I can.

Mr. MARTIN: I have been listening to this discussion with the hope of hearing something said upon a point upon which I am at present profoundly ignorant, and which strikes me as a most important point, namely, whether horses are to be got in this country at all. If they are to be got in the country, I am not in the position to make a speech to show you how they can be got from another country, because in that case I might be supposed to be acting in an antagonistic manner to the British producer. The question first to be decided is whether cavalry horses can be got at the price that the cavalry pay in England—first of all whether they are bred, and if so whether the people who breed them would part with them at that price. If I am justified in assuming, as I think I am, from one or two speakers who are evidently acquainted with the subject, that horses are not to be got, then I take a very strong ground, and I say that it would be very much better that the money of the English Government should go into the hands of their own Colonists than into the hands of foreigners. The whole question is bound up with that question of federation upon which you had a very excellent paper read only a few days ago—the Federation of the Colonies for mutual protection. Some six or eight years ago I was hunting buffaloes on the Foot Hills of the Rocky Mountains; I there found a very beautiful country, and I told members of the Canadian Government at the time, "this country is destined in the future to supply the remounts for the English cavalry." At the time I was looked upon as a madman; the winters in that part of the world were extremely severe and the whole thing was thought quite impossible. However, I was very much struck with the idea myself and I put it into execution. I have now got a couple of hundred horses running loose on the mountains, and I have also sent out some English thoroughbred stallions. I am not in a position to boast very much of the result at present, as I had to start with native mares, but they at any rate have certain qualities which would be peculiarly useful for cavalry purposes. They are not at all particular what food they get, they will eat anything they can pick up by the wayside and will stand an enormous amount of fatigue. They have legs and feet such as no one who has not been out of England could believe to exist; the feet are so hard and flinty that you cannot cut them with a knife, and their legs are something to dream about. But they have all the drawbacks of irregular breeding, they have a good deal of original barb blood, more than doubtful ewe-necks, heads put on wrong shoulders, in fact all the good and bad points of the barb, but of course it is a question for breeders who know the right way to breed whether by crossing them with really good horses you would ever be able to get suitable stock for cavalry purposes. My own opinion is that, given a naturally fine horse climate, it is really only a question of intelligence to be able to breed whatever you like. Whether one man's life is long enough to do it in is another thing. But one point which bears upon the question more particularly from my point of view is this, there must be some reason why the price of cavalry horses should be kept down to a very low point, I assume that there is a reason. A previous speaker who has bought largely in past years for the cavalry in England says that not many years ago they were to be bought at 28*l.*, and now you have to give over 40*l.* That is a very important question. Land in England is extremely valuable, the fee-simple varies from 25*l.* to 100*l.* an acre, and when you breed horses on valuable land they have to bear their share of rent and expense of production. I can quite conceive that except on the most inferior classes of land in England you could not breed horses and sell them as four-year-olds at 40*l.*, but if you cannot breed horses in this country at the price, you must then see where you can get them from or you must increase your price. If the price cannot be increased for practical reasons, and the supply to be obtained in England is not likely to be increased, and you have to look elsewhere, I merely suggest that you should look to the Colonies because we could produce them at the price, and I think it is merely a question of

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taking the trouble in order to produce the animal required. I could myself at the present time land a four-year-old horse between 15'2 and 16 hands high in London, and anything that I got over 15*l.* a-head would be net profit, which is rather an important point. I hope that nothing I have said will deter anybody from making efforts to carry on the most magnificent breed of horse in the world—the horses that are bred in England, such horses as are not bred in any other country, weight-carrying hunters, and so on; but I do really think if it comes to this point that we are likely to be absolutely without cavalry horses in the time of need, that there are parts of British North America which could supply the article required at a reasonable price and deliver them in immense quantities in England within fifteen days. What the importance of this from the military point of view is you are better able to judge than I am; the price at which they could be produced would be such that everything over 15*l.* or 20*l.* would be net profit, and of course people breeding horses in a large way as a matter of business would take very much less profit per head than the farmer who, only breeding two or three in the year, would naturally expect to make something out of them. I think that is all that I can contribute to the discussion.

Major-General GOODENOUGH, R.A.: May I ask Mr. Martin what are the sires from which the native stock of mares of which he has spoken have sprung?

Mr. MARTIN: I think it is generally admitted that there were no wild horses indigenous to North America. It is supposed that the Spanish cavalry under Cortez when they came and conquered that continent let their cavalry horses run loose on their return home and that that is the origin of the present breed. Those were presumably barbs. At any rate the typical mustang that you have read about, but very seldom see, presents all the good and bad points of the barb—just what you would expect if the barb had been allowed to run wild for 200 or 300 years and breed promiscuously. Horses under such circumstances always have a tendency to degenerate. As civilization reached the west the best and biggest of those mares were caught and mated with the Kentucky stock which the Americans at that time were doing their best to develop. I do not think Americans have the most elementary notions of horse-breeding, and beyond putting a little more bone into the original wild stock I do not think they added in any way to their attractions. Later on there were a few English thoroughbred horses out there that were really good horses, and it was seeing a few colts got in that way that led me to try my experiment. I do not wish to say too much about it, I am not sanguine about it, you want two or three generations to carry it out. I got the best of these wild mares, I picked them as big as I could, drafted them off carefully, and by that means got the best brood mares that I could. I then put to them large half-bred sires, what you would call in England good-looking 16 stone Irish hunters, stallions, rather cobby horses but with plenty of bone and good shoulders. The shoulders are the weak point. The result is I am now getting more mares bred in that way which are admittedly the best in the country, but how they would compare putting them alongside English horses I do not know; you would probably call them very ugly. They have most marvellous powers of endurance. A man weighing 20 stone rode one of these horses 280 miles and back again within six days, out of which he spent one day in doing his business. The horse was under 15 hands high, and the only food it had was what it could pick up from the grass, it was a long journey and good water was scarce in places. These horses have extraordinary powers of endurance, and can do, as I say, an immense quantity of work on very insufficient food. I think in a year or two's time I shall be justified in bringing over a cargo of these horses as an experiment, and seeing what they really will fetch, for I think that a person's opinion about his own stud is not as a rule a very reliable one.

Lieutenant-General Sir MICHAEL BIDDULPH, R.A.: I am sorry I had not the opportunity of hearing the lecture, but I know generally the arguments that have been used. From my own experience of the tremendous losses that take place in a prolonged march and in the operations of war, and of the difficulty that there is in finding a sufficient number of horses in this country ready to equip an army, I think it is necessary that some steps should be taken in the direction which Colonel Ravenhill has pointed out, to arrive at some means for providing a reserve of horses, or of improving the breed of horses in this country. During a long residence in

India I have assisted by counsel and also by serving on Committees in improving the breed of horses, and during the last twenty years in which I have attended the fairs in the north of India I have noticed that there has been a very great improvement in the stock and in the colts and fillies which have been produced, due to the selection of the mares there being branded according to the different class for which they are considered suitable. In fact they have gone down so far as to arrange which kind of mare should be suitable for breeding mules, but with that just now we have not to do. The idea has been prevalent in India, and I have advocated it, that the stock should be purchased young, and that there should be grass-runs where the young stock could be kept and prepared for the Service. What I have to say is this, seeing what very great difficulties have taken place in purchasing at short notice a sufficient number of horses to equip an Army Corps, it is necessary that some steps should be taken to secure the reserve advocated by the lecturer. I am sorry I cannot throw any further light on the subject, but there must be many gentlemen here connected with this country who can discuss the point, and suggest means which I am not capable of doing.

The CHAIRMAN: Gentlemen, the first question that strikes me is the supply of horses in this country, in other words the number of horses in this country. I believe there is an ample supply of horses in this country, ample in point of numbers, and as to draught horses ample in point of quality; but the question is not how many horses there are in the country, but how many can be purchased, that is to say, how many surplus horses there are over and above the absolute requirements of the trade of the country? Of course, you can buy a horse when a person is willing to sell a horse, but when, as in the case of war, the country is drawn upon heavily for horses, you will find people will not sell their horses at any price whatever, if they lose their trade by so doing. You can always buy 4,000 or 5,000 horses in this country without very much trouble. I think I may say during the Egyptian War we had no very great trouble in getting about that number of horses in the country. Colonel Ravenhill says we took eighteen weeks about it, but the fact is the Government were rather chary in finding money, as they were not certain whether the war was going to last. The question is, how many horses can you buy? In the course of the investigations made by the Committee which I was on, we made various inquiries, amongst others we referred to the London Omnibus Company. That company has 8,000 horses, and they said they could afford to sell about 2 per cent. of them. Doubtless, if we had offered somewhat more than the horses were worth, we could have bought a considerable number from the London Omnibus Company, because they could have replaced those horses easily; but supposing the country was pretty well drained of horses, they could not be replaced, and I believe you would very soon reach a point at which you could not buy horses at any price whatever, because people will not part with that which is essential to their trade. I think one of the gentlemen who spoke said that if during the war we had given a few pounds more for horses, we could have got a considerably increased number. Possibly at the outset of the demand you might, but my belief is, that when you have once drained the market of the surplus horses, no matter what price you offer for the horses, you will not be able to get them. To revert again to the London Omnibus Company, they could sell you as many as they could afford to sell, as long as they could replace them; but their trade lies in those horses, and they will not sell what is essential for the purpose of their trade for any sum of money you might offer. I feel convinced myself that the difficulty in mounting the cavalry corps rests, not in the insufficient number of horses in the country, but in the impossibility of buying those horses, and I believe very much the same difficulties occur in every foreign country. We very often hear that there are horses to be bought more cheaply in one place than another, but I think you will find that neither in foreign countries, nor at home, are any large number of horses kept over and above what the trade of the country requires. We do not want unbroken horses for the purposes of war; we want horses 5, 7, 8, or 9 years old which can be put into harness, and worked at once. I believe that the number of horses which you will find in any country in the world over and above the requirements of the trade of the country, are, comparatively speaking, few, and hence I look upon it, that you will have the very

greatest difficulty in getting any large number of horses under any purchase system. The Germans do it by registration, they do it by taking horses when they want them. The Indian Government possibly might take horses when they want them, but in a free country like this, it would have to be a question of buying the horses from the individual owner. Something has been said about the registration of horses, and I believe one or two gentlemen have said that would be a fallacy, that you would not get the horses when you wanted them. You could not go round, and have a monthly inspection to see whether the horses were there or not, and as this is a free country, and people buy and sell their horses when they like, I look upon registration as a pure fallacy. Now, about the number of horses in this country. I think Colonel Ravenhill agrees with me that the great failure in case of war would not be with regard to draught horses, but riding horses. The trade of the country is increasing year by year, and, therefore, probably the number of draught horses is increasing year by year. There are many more draught horses in England in this present year than there were in 1876. But the number of riding horses I believe to be steadily decreasing, and the reason is because farmers and other people who used to ride to market, and ride about the country, now nearly invariably come in by train or drive. In the neighbourhood in which I live there is a very good-sized market, everybody either drives in or comes by train. I don't think there are half a dozen farmers who ride into market at the present day, whereas forty years ago 90 per cent. of them came in in that way. Another reason why riding horses are falling off in point of number is this. The public as a rule are not very good judges whether a three-year-old is likely to prove what they want when it becomes five or six years old, and the larger and coarser horses that show a good deal of size and bone at three years old are what the public as a rule will give the most for; and consequently they are what breeders endeavour to breed. I am sure Mr. Lambert will agree with me that in Ireland you can buy horses best suited for troop purposes for about 25*l.*, while the coarser animals fetch readily 35*l.* or 40*l.* in the market; and that being the case, the breeder will look, not to the ultimate value of the horses, but to what will answer his purpose best to breed for selling at the earliest date at which you can sell the horse. There have been several questions raised about the price of troop horses, and whether the cavalry give a sufficient price for them; I need not tell you that neither the cavalry, nor anyone else, will give more than what they can get the article they want for. I am under the impression that, as a rule, our cavalry regiments are well mounted, and that being the case, I don't see that the Government require to give any higher price than they are now giving, but I am going to ask Colonel Ravenhill whether I am correct in stating the price which is paid to the farmer by the contractor for the R.A. and R.H.A. horses has not been always very considerably under the contract price, or, in other words, the price which the contractor receives from the State. I am perfectly prepared to say, speaking of some few years back, that having gone very frequently to the Irish market, and having selected horses which I have sent the dealer to buy (because that is the best way of doing it), that in the regiment, before we went to India, the average price paid in Ireland by the dealer was not above 25*l.* at the outside. The Government paid 40*l.* Therefore, it is not so much the price given by the Government, as the fact that the dealer would buy the horses as cheap as he could. And I think I may say as regards three-year-olds and four-year-olds that the Irish farmer looks upon the troop price as about the best price he is likely to get for what is known in the Irish market as the "long-tails." That being the case, I don't think any increase in price would be of the slightest possible use as regards troop horses. A statement has been made that farm horses are too heavy: I don't think you can help that; the fact is the horses in a county become heavier or lighter according to the soil and the grass. Nothing that you breed down in Lincolnshire would prevent the horses getting heavy, while if you breed in Ireland, nothing will prevent them becoming light and well-bred. I, therefore, do not think much can be done in the way of getting more riding horses in that direction. There have been several remarks made about the value of good stallions taken about the country. There are two sides, however, to that question. If the Government are giving subsidies to one class of stallions, they will starve other and pretty good horses out of the market, but still, I believe, it would be an advan-

tageous thing if a premium were paid to every stallion travelling the country, which the Board of Selection in the district thought worth keeping for breeding purposes, and it should be a condition that the horse stood for service at a moderate sum. Practically the Government certificate that he was a good sound stallion, and that owing to the Government subsidy he could serve mares as cheaply as the commoner brutes going about the country, would be very useful to the breed of horses. I am afraid that you will find that all through the country the cheapest stallion is the one employed. If you have one at 20s., and another at 40s., nearly all the trade goes to the one at 20s. It is an evil, and the only remedy I can see would be to subsidize the good stallions, so that they might offer to cover at the same price as inferior animals. Mr. Wilson made a very sensible remark, namely, that the reason why horse-breeding had fallen off was because, on account of the drainage of land and other causes, it was possible to rear beef and mutton more profitably than horses. I believe that is a great cause of the alleged failure of the breeding of lighter horses. Farmers will do what is most profitable, and they would be fools if they did not; it is absurd to expect them to do anything else; but I quite think now that beef and mutton have gone down considerably, and horses have gone up considerably, that, therefore, we may look to a more active breeding of horses. It has been suggested that an export duty should be put upon good mares. There cannot be a greater fallacy than that. If you want to discourage breeding, put a tax on the export. No man in his senses would think that good breeding, or a good race of horses, or a numerous race of horses could be propagated in a country by extinguishing the best demand for those horses. Some gentlemen have alluded to the value of the army demand for horses. A regular demand for horses, of course, is of value, but an irregular demand such as the Government would have to make on the outbreak of war or anything of the sort will never lead to breeding horses. It is a casual demand, and I believe whenever a war breaks out, you will have to resort very largely to foreign countries for the horses you want, because nobody will breed on the chance of a demand which may not occur once in twenty years. The Committee which sat some time ago, of which I was Chairman, recommended very strongly that all foreign markets should be tried. We often hear very wonderful tales about what foreign horses can do. There is scarcely a person comes home from abroad but says that in the particular Colony in which he has been, the horses do fabulous distances, and on very little food. I do not say in all cases the statements are erroneous, but I have seen something of foreign countries, and I am prepared to express my opinion that the value of many of the foreign breeds is exceedingly overrated. I have owned some of the best Arabs in India, but I have never known an Arab which would do a long day's journey as gaily, and come in as well, as a very ordinary Irish hack that you can buy for 25*l*. In illustration of what I have said, some years ago, when I was first Inspector-General of Cavalry, there was a Hungarian Committee which came over to London and offered to find 10,000 horses to be delivered in the London Docks at 38*l*. a-piece, to be only accepted in the London Docks. They were guaranteed to be 15·2, and generally five or six years old. At that time there was a ring formed by the Irish dealers who said that they could not find four-year-old horses, and they doubted whether they could find three-year-olds of good quality at Government prices. As I knew that to be pure nonsense, I recommended the Adjutant-General to accept the offer of the Hungarian Committee so far as buying a certain number of these Hungarian horses. Eventually a Committee, of which Mr. Collins, F.V.S., was one, was sent out to Buda-Pesth to buy 700 horses. What was the result? Instead of being able to get 10,000 horses all warranted 15·2, five and six years old, the Committee stayed there two months or two months and a half, and they brought home not 700 but 430 horses, very few 15·2, most not over 15·1, a considerable number 15, and some 14·3, and that was all they could get with two and half months' hard work in a country in which they were told they could get 10,000 horses all 15·2. The Government are going to send out to try the Canadian market, but I am afraid Mr. Martin won't have his horses ready by that time.

MR. MARTIN: Not at the price. I can sell everything I breed on the spot locally at 200 dollars.

THE CHAIRMAN: I understood you to say you could land them for 15*l*. at Liverpool.

Mr. MARTIN : I could sell them in England for 15*l.*, and everything I made over that would be net profit ; but that does not affect the fact that I have sold all I have bred on the spot for 200 dollars.

The CHAIRMAN : Colonel Ravenhill has made a proposal to carry out a scheme which consists largely of a scheme for the inspection of reserve horses, and he expects to get the money to defray the expenses of his scheme of inspection by putting a tax upon horses. His figures no doubt will bear out what he says, but I think any tax on horses would be beyond all question an evil ; I am quite certain it would do more harm than good. I do not think a system of reserves can be carried out for the reasons I believe I gave at first, namely, that you find people change their horses and you cannot inspect them sufficiently often. The yeomanry have been spoken of as a source of possibly remounting the cavalry. Well, I am afraid you will find a very large proportion of the yeomanry are not the owners of the horses which they ride, and that being the case, you would not get very much out of them. One or two remarks have been made on Government breeding and Government studs, and the value of that. I believe the experience of all Government studs is that they are a failure. Breeding is a specialty, and you require a body of men who can mate horses and mares together. It is a specialty, and when you are dealing with Government money, you are very likely to go on with a man perfectly honest and conscientious, but who does not possess the specialty, and the consequence is it will be a failure. It is also a failure for another reason, namely, the cost of breeding in studs where you have to pay for the food is exceedingly great. The Irish breed of horses is mainly produced by the small farmer class. He is a man with seven, ten, or twelve acres. He keeps an old mare for plough work ; the mare is covered every year, and there is a foal ; the foal runs about the grass and practically costs him nothing till it has become three years old, when he gets 25*l.* or 30*l.* for it, and he thinks he is exceedingly well paid. But the moment you keep horses and feed them in excess of the leavings of a farm, you will find their expense very much larger than 30*l.* The Indian Government many years ago had a very large horse-breeding establishment. I dare say many gentlemen who have been in India know what the Indian studs were. When I was in India some years ago the Government asked me what I thought their horses cost. I went round one or two of the studs, and I said I thought they cost upwards of 100*l.* a-piece ; that seems rather an astonishing amount of money for a remount. Years rolled on : I came home, and when I went out again I found they had had a Committee on the Indian Remount Establishment. They had appointed two Officers who were in favour of the studs and who wished to keep down the cost as much as they could, and two who wished to run up the cost, and an umpire. Those of the Committee who wished to keep down the alleged cost had to admit an average cost of 135*l.*, the others ran it up considerably more, and I believe you will find almost all horse-breeding establishments are and must be, for the reasons I have given, if not a failure, at least excessively expensive. I must confess I look upon this subject, notwithstanding Colonel Ravenhill's lecture, as one in which I am almost in a state of despair. I do not see how we are to get the horses we want for the purposes of war. Colonel Ravenhill has not at all exaggerated the number of horses an Army Corps would require ; in fact, he takes it at about the lowest estimate. It is quite certain we cannot get those horses in this country ; I have great doubts whether we could get them in any other country, unless you do as foreign countries do. If you like to stop the traffic in Regent-street and single out and appropriate all the horses that pass down, of course you will get your horses for an Army Corps ; but while it is as at present, I do not see how we are to meet the want of horses for war.

Colonel RAVENHILL : After what has passed, I shall keep you a very short time. Colonel Kingscote was good enough to remark that I had not stated the age at which the horses would be registered or bought ; that is a matter of detail I did not enter into in the paper, because I say in it they would be registered if found fit. Of course no horse, unless he is of a fit age for cavalry purposes, would be registered. You would not register a small thing two or three years old ; you would register nothing till it was absolutely fitted for cavalry purposes, and then I should propose to subsidize them. With regard to omnibus horses, of course they

are most valuable. The horses that ply for public hire about the country are well seasoned, well kept and fit for work, and those are the horses we want to get at by some means. Of course if we get an Act of Parliament to press every horse in the country, we know that there are heaps of horses in England, but no one wants to see the London carriage horse and the horses out of the different conveyances in Regent-street taken up. It is to provide in some other manner for this in an equitable way that I have made my proposition to-day. I think, on the whole, that this paper has conduced to a satisfactory expression generally. I knew perfectly well when I thought of making public such an idea as reimposing the horse-tax, it would meet with opposition from some—how could it be otherwise? But unless some measure is taken, it is impossible to say to what straits we are not coming in the matter of horse supply, not only for the Army, but for the country in general. Several gentlemen who have been kind enough to address the meeting to-day—Mr. Wilson, Mr. Gilbey, Colonel Kingscote, and others—can bear me out that nothing I have said here to-day is too strong to impress on the public the absolute necessity of something being done, and I do hope that this paper and the discussion of it may lead to a some feasible outcome. There is one other point I should like to touch upon, that is with regard to the prices to be paid. Sir Frederick Fitzwygram spoke of the prices paid by the contractor. It is true the contractor used to pay a very much smaller price than he received. I take it now that the contractors do not get quite so much out of it. It must be remembered, although the contractor makes his own arrangements with the farmer and breeder and gets a higher rate from the Government for the horse he delivers at the dépôt, still that difference in price is an insurance on the part of the Government that the contractor shall provide the horse safe and sound, shall deliver him all right, and in case of the horse having to be returned, the contractor has to take him back. The farmer could not possibly take up that risk. I have been all over England, and have had men buying for me in Norfolk, Devonshire, Yorkshire, Wales, and I have gone to a fair in Ireland where I have found them and other dealers from all parts of the globe congregated and bidding one against another. It is not that the horses are bred and produced in Devonshire, Norfolk, and so on; but the fact is that these very horses that the men show to me as the produce of their own county are bought wherever they can get them, and nearly all the well-bred horses we see about the country in England come from Ireland. There are very few horses bred in Yorkshire. I hope the breeding will improve, that the numbers will increase, and that what the Royal Agricultural Society has been good enough to do will have a good effect, but more money is wanted than they could possibly afford to give. I am extremely obliged to you for the patient way in which you have attended to this paper, and to the Chairman for having so kindly presided.

The CHAIRMAN: Gentlemen, it only remains for me to ask you to give a very cordial vote of thanks to the lecturer for what I think I may call his able and instructive lecture on this very difficult subject. If Colonel Ravenhill cannot show very distinctly how he would provide a reserve of horses, I do not think the failure rests with him, but in the difficulty of the subject. I believe he has put forward his views extremely well, and I hope that something may come out of them. I think you will all join with me in thanking Colonel Ravenhill very heartily.

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Wednesday, June 9, 1886.

GENERAL G. ERSKINE, Vice-Chairman of the Council, in the Chair.

THE NECESSITY FOR A PARTIAL ENFORCEMENT OF
THE BALLOT FOR THE MILITIA, AND ITS BEARING
ON THE REGULAR ARMY, THE YEOMANRY, AND THE
VOLUNTEERS.

By Major A. D. ANDERSON, R.H.A.

UNDER this heading I purpose inviting attention to the Militia, the Force maintained by the nation for home service, the backbone or foundation of any system of local defence, upon the condition of which much of the efficiency of the Regular Army, the Yeomanry, and the Volunteers should or could be made to depend.

I cannot but approach this subject with caution and almost surprise at my own rashness, when I recollect how ably the question has been treated by numerous members of this Institution, and when I study the valuable Report of the Committee which sat on the Militia in 1877; but I am emboldened when I notice that there runs through all the published utterances an indirect, and in some cases a direct confession, that after many years' experience, during which every conceivable remedy has been suggested and tried, the Militia as at present existing is neither complete nor sufficiently efficient: that many give these attempts up as a bad job, and boldly express their opinion, that as at present organized it is futile hoping to get the Militia up to the required standard of efficiency, and that recourse must be had to the Ballot; while the Militia Committee of 1877 conclude their Report with: "but we venture to point out that time and preparation are such material factors in modern wars, that without some previous organization it would be practically useless to revive, or even to recast, the laws affecting compulsory service."

Momentous words these, penned by a body of most experienced and highly responsible Officers, but as in time of invasion we would most certainly "revive the laws affecting compulsory service," it would be better to have the previous organization they speak of prepared and adopted now than wait for a time of emergency.

The Ballot Bill of 1860 stands as one of the Statutes of the land, by which the enrolment of all males over 5 feet 2 inches in height, and

between the ages of eighteen and thirty years, is provided for, and admits of the whole or part of these being taken as required.

This Ballot Act is, however, annually held in abeyance by Act of Parliament, and Forces dependent on their popularity with the masses, as is the Militia, continue in their normal state of unpreparedness.

One feels almost ashamed to repeat the hackneyed cry of "Prepare," but we find it in the mouth of every soldier or sailor who reads or thinks, and who has the honour and safety of his country at heart.

We need, for an illustration of the fate of such unpreparedness, go no farther than the campaign of 1870-71, where we saw the fairest provinces of France devastated by war, nobles and peasants alike sacrificing their lives as simple volunteers in the ranks, in a fruitless endeavour to retrieve what want of organization and preparation on the part of the State had entailed on their beloved country.

Such would be the case with England if invaded by hostile foes; thousands of all classes would gladly and proudly volunteer their services, but they would be but a courageous armed mob, with whom it would be practically impossible to achieve anything, owing to want of previous training, and they would be annihilated by regular troops, as were the Garde Mobile of France by the organized forces of the German Empire; while money would be made to flow like water, to, if possible, remedy what would then probably be irremediable.

It is therefore, I submit, a duty of the first and most urgent necessity that a law shall be enacted to place at the disposal of the military authorities the means, the men, and the power of organizing an ample Force for national defence, and these authorities should be held responsible for the thorough efficiency of this Force, as they at present are for that of the Regular Army.

The military authorities have now to take what they can get under voluntary enlistment, and make the best they can of it; and so averse is the Nation, and many Officers of Militia themselves, to conscription, that they would rather go on in an incomplete and insufficiently efficient state, than face the only remedy.

Assuming the advisability, even the necessity, of a large Militia Force for home defence, and in view of the fact that there is at present an annual expenditure on it of 1,348,100*l.*, it is right and fitting for us soldiers to consider its present efficiency as a military machine, and it is from the point of view that "the Militia as at present raised and trained, does not sufficiently represent the nation, or offer a safe groundwork upon which in time of attack from abroad, the remainder of the Regular Army, the Depôts, the Yeomanry, the Volunteers, and all rapidly organized levies could be grouped and formed for systematic defence," that I invite you to consider the question.

In discussing the fitness of the Militia to fulfil its mission as our "first line of internal defence," we must commence by dismissing from the calculation any hope of support in time of war from the Regular Army.

Past experience has convinced us that a European war, requiring the maintenance of two Army Corps in the field, in addition to supplying the wants of India, would drain the country of all Regulars and

Reserves, and necessitate the use of the youngest, last-joined recruits in the ranks of our battalions in the field; it also teaches us that the Regular Army left in Great Britain after a short continuance of a foreign war, would, instead of being able to furnish regiments for internal defence, consist of nothing but recruiting depôts, and would rather look to the Militia, and draw upon it for a supply of partially drilled and suitable men, than be able to contribute any appreciable forces for local defence.

As has been before said in this Institution, "the presence of the regular troops may be, in the first moment of invasion, considered an accident, and their functions should be of manœuvre, as a reserve, to consummate the defeat prepared by the resistance of the Militia, to which we must now add, of the Volunteers."

But I would go further; the Regular Army would more than likely be occupied abroad, and for its probable condition and that of the depôts remaining behind, we need no better illustration than the Army in the Peninsula in 1813, and its means of being reinforced in England. For the sake of exemplification we will take the three regiments best situated, and the three worst off, at that time:—

Corps.		Wanting to complete	Means of reinforcing the regiment.	Rank and file for immediate service in depôt.
Three best off.	5th Foot, 1st Battn.	none	2nd Battn., Exeter	344
	7th " "	none	2nd " Jersey	326
	91st " "	86	2nd " Ayr ..	362
Three worst off.	74th Foot	531	Depôt, Carlisle	10
	2nd " 3rd Battn.	486	" Battle.....	32
	30th " 2nd "	456	" Hull	16

Or, a shortcoming of 12,609 men wanting to complete establishments on a force of 68 regiments, and 6,480 men in England to meet the demand; this is leaving out of the question sick, 18,151.

It is therefore evident we must, under such conditions, dismiss from our thoughts any hope of expecting material assistance from the Regular Army, should England be invaded while we are engaged in a foreign war.

Thus the nation having only its Militia, Yeomanry, and Volunteers to depend on for national defence, should not rest content with half measures, but insist on such laws being passed as will leave no possibility of these Forces being ever found otherwise than in the most thoroughly efficient and prepared state.

This I submit is not now their condition. It is true that the Ballot Act, if enforced, would in time of war give us, as regards numbers, all we require, but it would then, in the moment of our greatest trouble, and possibly peril, give us but raw recruits with which to defend our hearths and homes. This state of affairs has been brought about,

not by supineness or neglect on the part of the Officers responsible for the Forces, but because the true foundation of internal defence, viz., that every sound man between certain ages is available for the defence of his country, has, in the Militia of to-day, been allowed to stand in abeyance; the State fixes the numbers required, and the pay, and takes what men are pleased to come. This has resulted in the standard being lowered to 5 feet 3 inches, and a 32-inch chest for lads over twenty years of age, and for those under that age to 5 feet 2 inches, and chest at discretion of examining medical officer; and therefore to the Force being far below an average specimen of our race, as regards size; to its being always from 20 to 25 per cent. under strength, or roughly, deficient of about 30,000 men on a total of 142,000; to a large deficiency in the complement of Officers; to about 25 per cent. of those enlisted not being forthcoming at the annual training; and to the standard of shooting being dangerously low,—while portions of the kingdom furnish heavy drafts for Militia, others supplying none, or next to none, and owing to the facility with which men can withdraw their names, to the possibility of their being absent, and to the numerous difficulties attending their training, no really fair standard of efficiency can be expected from them as a body.

This all arises from the good old fundamental rule of general liability for Militia service having been gradually lost sight of. So distasteful is "conscription" to our race, to men preoccupied with their business, their pleasures, everything except thinking ahead of the necessity for providing for the defence and protection of the same, that they are glad to shun the subject, or argue, "Let us pay more and get what we require;" but I submit it should not be so; we should pay for what is deemed necessary in the Navy or Regular Army, and for the requirements of efficient Yeomen and Volunteers, but there draw the line, and rigidly enforce the principle of universal liability for service in the Militia, for purposes of internal defence.

Without going so far on the one side as an Officer who writes—"All I can say, gentlemen, is that I should be proud to command such a force on any service, and I feel sure we should not get licked;" or as another, who, when speaking of the Militia being supported by voluntary enlistment, says—"And I think it the great glory of Old England that such is, and is likely to continue to be, the British system of our day;" very admirable sentiments, if capable of proof; nor upon the other side, as a third Officer, who, writing of the Militia, describes them as "in peace a charge, in war a weak defence,"—I shall, I feel certain, be expressing the opinion of the mass of Officers, Regular or Militia, when I apply to them the terms used by the late Captain Home, R.E., when speaking of the French Reserves before the last Franco-Prussian War, that "they are a mass of trained, partly trained, and untrained soldiers," and I trust I may be excused in making the attempt to sketch out in what this state of things appears capable of improvement.

The first tendency in all cases where larger establishments or greater efficiency are demanded is to yield to the clamour for increased

expenditure, and the cry comes alike from Army, Navy, Militia, Yeomanry, and Volunteers that more money is required to render the Forces decently effective, although the Naval and Military Budgets already stand at an extraordinarily high figure, and those who are called on to finance for these Forces must be driven to their wits' end to avoid the calls for further expenditure, and to devise methods for economizing.

There must, however, be a limit to this, and in carefully considering the matter, with the knowledge, that to stint the Army or Navy of necessary supplies, or to check the growth of the Yeomanry or Volunteer movements for want of small reasonable grants, is short-sighted policy, our thoughts naturally turn to the Militia, the statutory Force of the country, with the feeling that if economy cannot be effected in this vote, no increase of expenditure need be required for it; but after a careful study of the Force as it has existed for the past ten years, and having fully considered the very numerous suggestions that have been put forward for its improvement, the conviction is forced on us that, palatable or unpalatable, this economy can only be maintained, and the Force at the same time raised to completeness and efficiency, if the law of the land, the Ballot, be enforced when requisite.

From what has already been advanced, I submit—

1st. That improvement is desirable in the numbers, composition, and efficiency of the military forces provided for home defence.

2nd. That for the Militia such laws should be enacted and put in force as will give the power of providing such a Force as would, along with the Yeomanry and Volunteers, be fully efficient and adequate for internal defence.

This I hope to be able to show may be done with little if any increased cost.

Before going any further, let us look back at what our ancestors did.

In the years 1803-4, or it may be said at a time when invasion of England was more seriously planned by a Foreign Power than at any period in the century, when Napoleon I was but waiting an opportunity to transport his fully organized and enthusiastic army from Boulogne to the coasts of England, confident of success if they could but land, George III, in continuation of former Militia Acts, issued one amending and annulling all others, and commencing as follows:—

"Whereas a *respectable* military force under the command of *Officers possessing landed property* within Great Britain is essential to the Constitution, and the Militia as by law established, through its *constant readiness on short notice for effectual service*, has been found of the utmost importance to the internal defence of this realm," &c.

I would here invite attention to the words underlined by me—

1st. The force was to be "*respectable*" as regards the strength maintained.

2nd. Officers to "*possess landed property.*"

3rd. "*Constant readiness on short notice for effectual service.*"

To carry out the above conditions, the Act referred to further
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provides, that out of a total population in England and Wales of some 8,000,000, a force of 41,000 Militia should be maintained, taken by ballot from all males, with a few exceptions, between the ages of 15 and 45, fit for service, and from every locality in proportion to population, endeavours being made to regulate the demand equally on all alike; that Officers appointed to the Militia should be possessed of property or estate in the county, city, or town, valued at that time at sums varying from 400*l.* a-year for a Colonel to 20*l.* a-year for an Ensign; that a man chosen by ballot might if he so wished, and was able, produce for his substitute a man of the same county, riding, or place, or of some adjoining parish or place, whether in the same county or riding or not, able and fit for service;

And, lastly, that the force should be kept efficient and in readiness for work at short notice.

Here, then, we have the State providing a sound groundwork of efficiency.

(a.) A simple and sure method of keeping the ranks fully supplied with the required complement of suitable men locally raised, with a minimum height of 5 feet 4 inches; each county being responsible for its own quota.

(b.) A complete establishment of Officers closely connected with the county.

(c.) The power of rendering all efficient.

With opportunities as described above, should the machine when put upon its trial have been found wanting or inefficient, all blame could with justice have been thrown on the Officers whose duty consists in keeping thoroughly serviceable the charge they receive over.

Such unfortunately is not now the case. Military or Militia Officers could not be held at fault for inefficiencies originated by such a system as the present, and the nation could blame no one but themselves. Instead of a Force as described above, provided by the Act George III, the military authorities have now—

(a.) A militia bearing a proportion to the population eligible for selection of about 2 per cent., with a very reduced standard of height and size; while the full numbers, owing to the scarcity of recruits, are never procurable.

(b.) An insufficient number of Officers raised from all parts of the kingdom, while the cadets use the force as a stepping-stone, and have, therefore, not its interests sufficiently at heart.

(c.) Insufficient power over the force to make them individually efficient.

Thus when the day of trouble comes, with its accompanying recriminations, blame could in no possible way be laid at the door of the military departments responsible for the Militia or of the Militia Officers themselves.

No better instance could be found of the apathy of the nation, of its tendency to leave existing conditions alone, and its dislike to face the possibilities of the future, than the late Socialistic riots in London.

The London Police were always looked on as a most efficient force, fully competent for all work likely to be required of them, but it does not come to light until a serious catastrophe has occurred, that the system under which they have for years past been working has been all along most faulty, and much of the blame is rightly attributed to this cause.

We can afford to run these risks in connection with riots and our Police Force, for we can rectify matters and pay compensation at our leisure, but with foreign invasion and our Militia it becomes, I may say, criminal, to rest until the nation can say, "We here hand over the materials and power for a complete organization," having thus done their duty, and being fully justified after that in laying all blame for any failure on those Officers to whose care they entrust the Force.

From the above, it will be seen that I do not propose to urge a desertion from our own institutions or imitation of those of a foreign nation, but to revert to so much of the Ballot Bills of 1803 and 1804, and to enforce so much of that of 1860, as will admit of the Militia being raised and maintained on an efficient footing, and the Force organized somewhat on the following basis:—

(a.) Strength of Militia Force to be fixed by the State at a percentage on the population; the local authorities of each county being responsible for their own quota.

(b.) Every male resident in the country between the ages of 18 and 40 years to be eligible to serve; except peers of the realm, clergy, officials of the Civil Government, Officers and men of the Army and Navy, efficient Yeomanry and Volunteers, employés in Government factories, and those physically unfit.

(c.) Terms of service.—Enlistment for ten years' Militia service, with liability to be called out after that to the age of 40 in case of invasion; all others between the ages of 18 to 28 to be available for ballot to fill vacancies in their own county.

(d.) The Force to be paid under regulations now existing; to be recruited as at present by voluntary enlistment, any deficiency in the quota being made up by the local authorities by ballot from the county.

(e.) A man chosen by ballot and unwilling to serve, to be allowed to find, if possible, a suitable and eligible substitute from his own or any other county.

(f.) Officers to be selected by the State from among applicants, residents of the county, in possession of landed or other property to the amount of, for a—

	£
Lieutenant-Colonel	600 a-year.
Major	400 "
Captain	300 "
Lieutenant	200 "

Failing a sufficiency of applicants, the required number to be balloted for among those in the county in possession of the above qualifications.

(g.) Officers to qualify by service with the local battalion of the Regular Forces until fully efficient, failing which to revert and complete service in the ranks.

(h.) The length of the annual training to be, if possible, reduced, and made good by an extra fifty-two hours per annum for preliminary drills and musketry.

(i.) Standard.—That a higher standard be fixed for artillery and infantry; men under height and over 5 ft. 2 in. to be enlisted for the other branches, such as engineers, transport, commissariat, &c.

(k.) Nothing in these regulations to affect the provisions of the Ballot Act, by which all males over 5 ft. 2 in., and between certain ages, are available for service in time of invasion.

Before considering the results to the country and to the Militia of these proposals, permit me to direct your attention for a little to the prominent factor in the scheme, "the Ballot."

This word "Ballot" conveys to us a meaning with very much harsher accompaniments than in this case it really possesses, when we bear in mind that the ranks of the Militia are three parts filled at this moment by voluntary enlistment, that none of the inducements to this voluntary service would be abated, and that the ballot would only be enforced to complete the existing deficiencies in those counties which do not furnish their respective quota.

Further, when we consider the duties that a militiaman in peacetime is called upon to perform, duties by no means irksome, and which to many form a pleasant change, almost a holiday, we feel convinced that those who inquire into the probable results will find that the amount of enforced militia service which it would be necessary to exact would certainly not entail the hardship that at the first blush the word "Ballot" conveys.

Now to proceed with the different proposals:—

(a.) "Strength of the Militia Force to be fixed by the State, at a percentage on the population; the local authorities of each county being responsible for their own quota."

As has already been shown, the drain caused on the male population resident in the United Kingdom, between the ages of 18 and 40, to furnish the 142,000 men now required, amounts to only about 2 per cent. This force, if kept up to full strength and highly efficient, is ample, but I submit the principles on which it is raised lack two essential qualifications—

Firstly.—The whole population do not bear the burden alike.

Secondly.—No sufficient provision is made for engineers, transport, commissariat, or any organization for harbour defence.

George III in his Ballot Act of 1803 drew Militia from every county, as far as we can gather, in proportion to population, and held each county responsible for its own quota; it being allowed to individuals to find a substitute from those not taken by ballot.

So it should now be; instead of recruiting the force from districts where men are most likely to be forthcoming, the old system of county organization as tending most to *esprit de corps* should be reverted to, the population of each county being drawn on to the

extent of 2 per cent., or whatever proportion may have been fixed, of males between 18 and 28 for its quota, to be raised as far as possible by voluntary enlistment as at present, and deficiencies to be completed by the ballot; arrangements for which to be carried out by the Lord Lieutenant of the county and entirely under the control of the civil authorities, who should cause lists of eligible men to be kept up.

Take as an example Devonshire; population of 286,242 males, from which the State now hopes for 1,742 Militia.

From this the number of Officers is complete, and there is a deficiency of about 500 rank and file; these the county would have to make good, being responsible for its own shortcomings. It does not at all follow that to do this the ballot need at once be enforced; the county would undoubtedly find various ways of producing the men required, and hold the ballot in hand as a last resort; while the State need not question the means, if legitimate, so long as the end be attained.

With regard to the second requirement, no Force of this description can be considered efficient that does not contain in itself a complete organization, and we should not rest satisfied with the provision of infantry and some artillery; the Force should consist of—

Infantry.	Transport	} Corps;
Artillery.	Commissariat	
Engineers.	Telegraph	

the exact proportion of each being fixed by the military authorities, who would take into consideration the probable requirements of each county, while a full and sufficient body of men for torpedo corps and harbour defence boats, taken from the seafaring population round our coasts, could without difficulty be fixed; men below the standard in height being accepted for all except artillery and infantry.

(b.) "Every male resident in the country, between the ages of 18 and 40 to be eligible to serve, except peers of the realm, clergy, officers of the Civil Government, Officers and men of the Army and Navy, efficient Yeomanry and Volunteers, employés in Government factories, and those physically unfit."

The above are practically the classes who were exempted in years gone by.

Peers of the realm: by virtue of their position; some would add Members of Parliament; I would not, they can if they wish provide a substitute.

Clergy: out of respect for their occupation.

Officers of the Civil Government: because the Government of the country must proceed.

Employés in Government factories: because munitions of war will continue to be required.

Officers and men of Army and Navy: otherwise employed by Government.

Efficient Yeomanry and Volunteers: ditto.

And those physically unfit.

I cannot think of any other class whose duty it would not be, in the hour of invasion, to be up and doing.

(c.) "Terms of service.—Enlistment for ten years' Militia service, with the liability of being called out after that up to the age of 40 in case of invasion; all others between the ages of 18 and 28 to be available for ballot to fill vacancies in their own county."

The present system of six years' Militia service, with 25 per cent. passing into the Reserve for four years, gives us roughly 110,000 men effective, including Reserve, and after deducting absentees; this Reserve being unlike most others of the name, in that it forms part of the embodied force, and is no increase of strength, being simply a portion to be called out first, if required; while a compulsorily completed Militia with a service of ten years, and further liability for another twelve, would, if the establishment were maintained at 142,000, as it now on paper is, place more than double that number at the disposal of the State, in fact close on 300,000 men, a number in excess of what will, I think, be deemed necessary, and which would, after the first fifteen years, admit of a reduction of the embodied force to 100,000, yielding when complete 200,000 for defensive purposes.

Another alternative is worthy of consideration, viz., a recruits' training of 93 days and a shorter Militia service, say 4, 5, or 6 years, thus passing men quicker through the ranks and admitting of a reduction of the strength; but this could only be attempted after it was clearly proved that the required efficiency could be attained equally well with a shorter service.

As this scheme developed, and, as it undoubtedly would do, filled the ranks of the Yeomanry and Volunteers to overflowing, the possibility of gradually reducing the Militia could be taken advantage of.

Here again George III., at the beginning of the century, gives us a good line. From a population of 8,000,000, exemption from liability to ballot so filled the ranks of the Volunteers, that 300,000 were enrolled, and it was only necessary to keep up 41,000 Militia, a very different ratio to what now exists, viz., 250,000 Volunteers to 142,000 Militia, out of a very much larger population (17,000,000).

(d.) "The Force to be paid under regulations now existing; to be recruited as at present by voluntary enlistment, any deficiency in the quota being made up by the local authorities by ballot from the county."

The Militia are at present paid practically the same as the Regular Army, and with the Ballot in force it would undoubtedly be possible to effect a reduction of pay, and a saving on the vote. This, however, would rob the Force of much of its popularity, and render voluntary enlistment (which we have every right to expect should continue, as at present, the rule) the exception. If at the same time economy becomes imperative, reductions must take place in the pay of the Officers (exclusive of the Commanding Officer) and the rank and file, not among the permanent staff or non-commissioned officers.

Good Commanding Officers make good Officers and good battalions; without these it is hopeless to expect any efficiency, and no pains

should be spared to secure them. Raise the standard of indiscriminate selection to any necessary pitch, and offer what emoluments may be deemed advisable, but secure the best men possible for these posts, and much of the difficulty will be solved.

From Officers and non-commissioned officers of the permanent staff, as will be shown later on, much must be expected, and every effort and inducement should be exerted and held out to obtain thoroughly efficient men. No reduction in their pay would be good economy, and, as I said before, if compelled to offer them more, do so at the expense of the remainder of the Officers and of the rank and file. I think, however, it will be found that very considerable reductions can be effected, as I am proposing, without lowering rates of pay, which should only be resorted to for very urgent reasons, as tending, as a matter of course, to lessen the popularity of the Service.

(e.) "A man chosen by ballot and unwilling to serve, to be allowed to find, if possible, a suitable and eligible substitute."

This is a point with which the State need not concern itself; the man must appear or find a suitable substitute. We know well enough that Militia service, with its annual outing, change of scene and life, with its gaieties and fun, renders the duty sufficiently congenial to many, and that we need not fear that if men be driven to find substitutes, either as Officers or as privates, ruinously high sums will have to be given, or should they have to serve themselves, any great injury will have been inflicted on the individuals.

(f.) "Officers to be selected by the State from among applicants, being residents of the county, in possession of landed or other property to the amount of, for a

	£
Lieutenant-Colonel	600 a-year.
Major	400 "
Captain	300 "
Lieutenant	200 "

Failing a sufficiency, the required number to be balloted for among those in the county possessing the above qualifications."

Next in importance to completing a military force with good recruits, stands officering it.

Sir Donald Stewart's remark that young soldiers can do anything if properly handled, contains the whole pith of the argument. Officers are nine-tenths of the battle; without efficiency among them there can be no real efficiency in the ranks.

Although the Army List shows a large number of Officers posted to the Militia, I think I am safe in saying the whole Force is close on 1,000 short of its full strength, chiefly in the junior ranks, while a large proportion of the subalterns at present use the Force as a stepping-stone to the Regular Army, and are therefore of but little permanent use to the Militia; further, although it is known how many really efficient Officers there are in the Force, we cannot close our eyes to the fact that there are numbers who look upon their duties in it as pastime and amusement, and scarcely the serious responsibility which

it in reality is, while there are Commanding Officers who not only are far from being at home in command of a single battalion in the field, but would themselves be more distressed than anyone else if asked to handle a brigade on parade or at manœuvres.

The importance of this question to the Force cannot be over-estimated; its whole value as a fighting machine, or as an expensive toy, hinges on it, and the Officers themselves are always the first who appreciate endeavours to practically improve their efficiency. To the value of drawing for Officers on the gentlemen of the county I attach the greatest importance, and further also the power, in the case of their not fully qualifying, of relegating them for their further service to the ranks of the Militia.

At present the book portion of examinations for Lieutenant, Captain, and Major is severe enough, were only the Officers as conversant with field duties. I do not for an instant mean to insinuate that there are not many who are so, but if there be a doubtful one, the power of replacing him by a certainty should be there. Half-trained soldiers are more difficult to lead than those fully trained, and much is therefore required from Militia Officers.

This proposition to expect the private gentleman, who in many cases has nothing to do but amuse himself, to apply some of his leisure-time seriously to Militia duties, will not be a popular one, but it is nevertheless one of the most essential points. Without local connection and a high standard of efficiency, Officers in a local Militia are valueless, and no sentimental ideas should for a moment be entertained to prevent the highest and best results being demanded from them.

The idea of the irksomeness of the duty is far greater than the reality, and once fully qualified, very little trouble is necessary to remain so, while to a young man who knows his work, interest is sure to arise in it, and pleasure and pride be derived from it.

(g.) "Officers to qualify by service with the local battalion of the Regular Forces until fully efficient, failing which to revert and complete service in the ranks."

The above runs with the preceding paragraph, and should be rigidly enforced; ample opportunities exist for Officers to thus fully qualify themselves, and no relaxation of the rule should be permitted, when we bear in mind that one inefficient Officer is a positive source of danger.

(h.) "The length of the annual training to be, if possible, reduced, and made good by an extra fifty-two hours per annum for preliminary drills and musketry."

The militiaman of to-day undergoes when a recruit a preliminary drill of fifty-six days in his first year, and an annual training of twenty-eight days. In his recruit drill the rough edge is taken off him, and he goes through a short course of musketry, while during the annual drills his time is fully occupied with setting up, squad, company, and battalion drills; three to four days are allowed for musketry, and one to brigade drills; the result of all this is, that, speaking generally of the Force, manœuvres in brigade are to them unknown,

and musketry stands at the lowest point. Officers and men who do not practise movements more than one day in a year, and that at most with only two or three battalions; who have never in their lives, perhaps, taken part in the manœuvres of large bodies of troops, cannot possibly be expected to know anything about it, and would have to learn their lesson as best they could, if time were allowed them, after war broke out; while as regards shooting, nothing could be done but accept matters as they stood.

An Inspecting Officer says of the Militia, "making every allowance, the shooting is very, very far from what it should be, and every effort must be made to reach a higher standard," while an Officer of the Force remarks, "they are to a great extent untrained in shooting." This is scarcely to be wondered at, when we know how little time can be spared for musketry; that the permanent staff have, in that short period, to deal with 600 or 800 men, to whom it is impossible they can do justice in the time, resulting in many corps putting only a half battalion through each training; that out of 148 battalions, only about 100 train annually; that only about 70 per cent. of those embodied can be got for musketry; and that barely 50,000 of the whole Force annually go to the targets, the natural result of which is, the figure of merit of shooting is very low.

Now, considering that the beginning and end of soldiers is, that they shall march and shoot, that they shall be capable of being moved in masses from point to point, and, when required, handle their rifles skilfully and accurately, reflection as to how far our Militia of to-day, in its training, prepares itself for or comes up to these requirements, must cause serious misgivings. To effect improvement in the manœuvring power of the force would be a simple matter, calling for a little increased attention to that branch of training, but good shooting cannot be taught in a hurry; it must be the result of patient care, training, and practice, without attention to which all soldiers are valueless. Officers labour at and elaborate schemes for the defence of the country, but what, I would ask you, is the use of schemes of land defence of any sort, if the men we purpose using in these defences can't shoot? Until we ensure good shooting, schemes of defence, be they ever so able, are only worth the paper they are written on. General Brackenbury accurately described what we require, when he said:

"If we could only train infantry soldiers to shoot until each man had such confidence in himself and his weapon that he felt himself equal to any odds, you might do what you pleased with them;" and towards this end we must always strive.

To arrive at this in the Militia, a change in the system of training will be necessary; shooting and manœuvring must be the crucial test of efficiency, not smart appearance, marching past, and battalion drill.

Considering the number of men to be dealt with in each corps and the size of the permanent staff, it will be necessary to have the power of carrying on instruction for some additional time other than the annual training, when all are fully occupied, with a view to working the men up in preliminary drills before they are embodied, and

thoroughly preparing them in musketry: to this end I have proposed that one hour per week, or a total of fifty-two in the year, be devoted to this purpose.

This amount of time is little enough to expect from a man for such an object, and it could most profitably be spent under the superintendence of the permanent staff, on the drill ground or ranges, in the long summer evenings or on half holidays, and in shooting galleries during the winter nights.

We hear reports of Militia battalions being unable to practise for want of ranges which one can scarcely believe to be true; the State might as well disband corps, whom it is not prepared to instruct in musketry, and should allow no expenditure to take precedence of ranges and shooting galleries for its troops of all classes. That the shooting of Militia Artillery is below the mark cannot be wondered at, if their want of opportunity be realized or known, and this can best be described in the words of an Officer of that branch when speaking of his own battery, viz., "They have never seen, fired from, or drilled with a rifled gun of any kind, or ever seen a rifled gun cartridge, and they only use their carbines for manual and platoon drill." To carry out this intermediate instruction, which should for the convenience of the Force be spread throughout the year, the permanent staff of the Militia would require to be placed more fully at the disposal of the Commanding Officers of Militia battalions than they at present are.

It is of course necessary that the Militia should bear its share, but not an undue proportion, of the duties arising from the brigade dépôt, the benefits of which it enjoys with its affiliated battalions of the Line, but no duty should be allowed to prevent their permanent staff from giving full and undivided attention to these intermediate drills.

If these 52 hours be effectively carried out, in no way interfering with the present preliminary drill of the recruit, which is in all cases necessary, the militiaman will present himself before his Commanding Officer a decently drilled man, sufficiently instructed in target shooting, and it will only remain needful to drill him in battalion and brigade, and exercise him in manœuvres with field-firing, and should men be found still inefficient, power should be given to Commanding Officers to render them efficient by keeping them for a further fortnight or month after the completion of the annual training for musketry instruction, until they reach the required standard.

Under such conditions we are, I consider, justified in considering whether the period of annual training could not be reduced, and I submit this could be done to the extent of 14 days, without in any way diminishing the efficiency of the Force, at a saving of expense to the State, and at the same time withdrawing men from their occupations 14 instead of 28 days. With men prepared as I have proposed, by their 52 hours in musketry and elementary drill, the fortnight of annual training would amply suffice for—

1st Week.—Muster,
Issue of Clothing, &c.,
Battalion and Brigade Drills,

2nd Week.—Manœuvres or Camp of Exercise,
Field Firing;

which, with a sufficient permanent staff and thoroughly efficient Officers who must beforehand have learnt their work when attached to the Regular Army, would I feel confident yield very much higher results than are in any degree possible under the present system.

Some will doubtless urge the difficulties that may arise in carrying out the fifty-two hours' preliminary drill; I can see no more difficulties than at present oppose the Volunteers; they find it possible to devote stray hours throughout the week to drill, and there is no doubt that there are numerous idle moments which could be profitably so employed; these the permanent staff must watch and utilize to the best purpose, while it would seem advantageous and economical that these setting up and musketry drills should be given along with those of the Volunteers whose sergeant-instructors might materially assist the permanent staff of the Militia, and *vice versâ*.

Others will argue, that as much is lost by dispensing with 14 days of the annual training as by adding 52 hours of preliminary drill; this would, however, not be the case. Granting that every recruit receives his 56 days' recruit drill, 52 hours per annum will be ample for an intelligent, willing man, who picks up some small idea of musketry, to qualify, while those less skilled with the rifle could devote more preliminary hours to practice, well knowing that any shortcomings on their part would render them, in common with all who are found inefficient from carelessness or other causes, liable to a fortnight, a month, or such additional drill after the completion of the annual training as the Commanding Officer might deem to be requisite.

To this power in hands of Commanding Officers, to detain Officers and men till qualified, the highest importance may, I feel sure, be attached. Voluntary effort, as a question of self-interest, in addition to zeal, will with the majority be encouraged to the fullest extent, while at the completion of the training the whole attention of the Staff could be devoted to those who have been found backward.¹

While on this subject it appears clear that the two points in the training of the Militia soldier, which should never be lost sight of, irrespective of the branch of the corps to which he may belong, are—

(a.) That he shall be led to take an interest in shooting and be thoroughly instructed in the same.

(b.) That he shall spend one week of the annual training in a camp

¹ Since writing the above, a Militia Commanding Officer has kindly given me the opportunity of inquiring from his men, in his presence, as to how the proposed change would affect them. With one exception all preferred the 14 days, being confident that they could find the time to do the 52 hours in their leisure moments, and also that they could thus reach a higher average in musketry.—A. D. A.

of exercise, if it be only a small one, and that opportunities as convenient be taken of moving and forming bodies of Militia on different points with defensive objects; all duties being performed by the force with its own men and material and without aid from the Regular Army, and further, that when sufficiently far advanced, Yeomanry and Volunteers be brigaded with and formed on them.

(i.) "Standard.—That a higher standard be fixed for infantry and artillery; men under height and over 5 feet 2 inches to be enlisted in the other branches."

Although the localization of the Army and the connection of Regulars, Militia, and Volunteers was perhaps one of the soundest and most beneficial measures ever introduced, the continuation of which, the still closer binding together of the three forces, should never be lost sight of, as tending to materially improve all; one point that should not be encouraged is, that by means of this connection, small, under-sized men may make use of the low standard of the Militia (5 feet 3 inches with a 32-inch chest and less for boys) to obtain an entrance into the Regular Army, thus lowering its standard of size.

George III accepted no one under 5 feet 4 inches in his Ballot Act; we have not only fallen below that for our voluntary Militia, but down to 5 feet 2 inches in our Ballot Bill of 1860.

Note what the Inspector-General of Recruiting says: "If it is agreed that a man between 5 feet 3 inches and 5 feet 4 inches when properly developed, and with a good chest, can make a good infantry soldier, then the criticism as to shortness *quâ* shortness falls to the ground."

But this is not by any means agreed to; the military authorities are, against their will and wishes, driven to low standards to keep the ranks in any way up to the establishments.

What does raising or lowering the standards denote? Not a change of opinion as to the class of men, but a plenty or a scarcity of recruits; we find the ranks of the Foot Guards filled over establishments, the standard is raised from 5 feet 7 inches to 5 feet 8 inches; recruits are scarce for other portions of the Army, the standard is lowered in one way or another. On no point is there a greater consensus of opinion among Officers of the Army and Militia than that, though the recruit of to-day and of the last few years has steadily and decidedly improved in education, intelligence, and orderly behaviour, as compared with his predecessors, the physique, height, and chest measurement have fallen off and are below what is required.

This opinion is also found fully borne out in the reports of Officers commanding regimental districts where recruiting is carried on. There is no necessity to discuss this fact or its causes: there it stands firmly rooted in the minds of nine out of every ten Officers of every branch of the Army, and the nation should not and cannot afford to ignore it.

The short service system, with its necessary reserves, forms a younger army than did long service, while youth combined with reduction in physique entails a loss of power which becomes a serious

consideration, and can only be met by raising the standard of both Regulars and Militia.

This should be done to the extent of an inch, and no man be taken under 5 feet 5 inches into the Army, or 5 feet 4 inches into the Militia, for infantry or artillery, with proportionate chest measurement.

In the case of the Army, it is yearly becoming better known and more popular; but even should raising the standard mean extra expenditure, it is an outlay that should not be shirked, while in the Militia it would only necessitate a greater number being completed by ballot, and would ensure a larger stamp of man and one more suited, in the opinion of all, for the work required of him.

A certain proportion of the smaller men from 5 feet 2 inches to 5 feet 4 inches, and in the Army 5 feet 5 inches, but with good chest measurements, could with advantage be utilized in all the branches of the Army and Militia except those already mentioned.

(k.) "Nothing in these proposals to affect the provisions of the Ballot Act, by which all males over 5 feet 2 inches between certain ages are available for service in time of invasion."

Whatever regulations the State may adopt for the Militia, Yeomanry, and Volunteers, the power of calling on every efficient male for service in case of invasion would as a matter of course be necessary, and all the machinery for exercising the ballot for this should be kept in readiness.

Having now sketched out, as fully as space will permit, proposals which, in conjunction with the introduction of the ballot to fill vacancies in the Militia, would, I submit, materially strengthen and improve the Force, let us turn to the probable effect of the same on the Regular Army, the Yeomanry, and the Volunteers.

History continues to repeat itself, in recording the valuable assistance afforded to the nation and the Regular Army by the Militia in the Peninsular and Crimean wars; whole battalions volunteered for active service, while regiments were transferred twice over to recruit the troops in the field, and first-class work many of them did; but that was in the times when wars started slowly and progressed equally slowly; the Militia of the day had then plenty of leisure to organize and perfect itself.

Now, when everything moves faster, when large armies are kept ready for immediate action, and wars are commenced, carried through, and ended with the greatest possible rapidity, it is madness for us to leave any essential precaution to the chance of being allowed time to attend to it when war is declared; and what is deemed requisite for the Militia should before everything else receive attention and preparation, to ensure that if required for service in or out of the kingdom, we may safely rely on them.

Since the introduction of the localization scheme, the ties between the local battalions of the Regular Army and the Militia have gradually tightened, as may be seen by the steady increase of recruiting from the latter to the former, amounting in 1884 to 13,259 men from the Militia out of 35,653 recruits raised for the Army. Thus,

not only is it of importance to the Army that these men be of the best possible stamp, and well drilled, but it is of far greater moment that the Reserves (as Militia battalions undoubtedly are) which they leave behind them when they go on service, and to whom they naturally look for their best recruits, are thoroughly efficient and on a sound footing. Still further, the knowledge that we possessed a highly efficient Militia would immensely strengthen the hands of the military authorities when denuding the country of the Regular Army to support our forces in the field, in that the legitimate defenders of the nation were at hand and equal to their own task.

That the Yeomanry would find it easier to complete their numbers, were freedom from Militia service granted to them, most of their own Officers will readily allow, and though we have no former experience on this point to work upon, I feel certain it would be found to be so. Should it, however, turn out otherwise, theirs is only a question of horses; given a sufficiency of these to hand, the Yeomen will be forthcoming, and it would, after trial of exemption from Militia Ballot had been found ineffective, become necessary to consider whether it might not be better to reduce the present number, 14,405, of whom some 4,000 are now deficient, and slightly increase the capitation grant.

The benefits that would accrue to the Volunteer Force by exemption from liability to ballot for the Militia being granted to efficient Volunteers are admitted by all, and can scarcely be calculated.

Friends of the Force, in their enthusiasm, claim for them great things, such as "being our first line of defence in case of invasion," &c., &c., while they make many suggestions, chiefly in the shape of appeals to patriotism, by way of remedy for existing inefficiencies, but there it may be said the matter rests. The Force is, I understand, at this moment some 1,500 Officers and 50,000 men short of what is considered full strength, while none will deny that with opportunities, many of the inefficiencies complained of could be removed. The world produces no finer force in physique or intelligence than our Volunteers; and as a nation we have every reason to be proud of them, but their organization precludes our getting at them with a view to increasing efficiency in any other way than, as it were, indirectly.

The exemption of efficient Volunteers from Militia service would, however, effect what nothing else will, without in any way touching the constitution of the Force as purely voluntary. As only a thoroughly efficient Volunteer would be exempted from the Militia ballot, the Officers would be able to insist on greater regularity and attention to drill than they can now do, and also to introduce and enforce a sufficient code of discipline; and thus the whole condition of the Volunteer Force would be most materially improved. It is probable that the indirect pressure of the ballot would be so great, that applicants for service as Volunteers would exceed the requirements.

George III, in 1803, similarly exempted Volunteers, with the result that 300,000 out of the then much smaller population were enrolled. We do not require that number at present, but the State could by

this means raise the standard of efficiency of both Officers and men in shooting and general duties to any reasonable pitch. A claim for an increase in the capitation grant has just been staved off; but it is necessary; the State will have to give in, and the pockets of the Force will thereby be relieved. I would suggest that, in making the grant, a part of it be applied to providing drill halls and musketry ranges, which would do for the training of the Militia as well as the Volunteers. The Volunteers are not, and cannot ever become, our "first line of defence," but they are a most valuable and necessary adjunct to it, their efficiency ranking only second in importance for internal defence to that of the Militia; and in the manner I have pointed out this may be very materially improved without any additional expense.

Let us now enumerate the advantages that may with justice be claimed for these proposals:—

1. A thoroughly efficient Militia for our first line of internal defence, upon which economy can be effected by—

(a.) Reduction by degrees of the force from 142,000 to 100,000, or even lower, if the Volunteer force were increased.

(b.) Shortening of the annual training.

(c.) Saving of all expenditure on the present Militia Reserve in the shape of bounty, &c.

2. A strong and efficient reserve for the Regular Army.

3. The completion of the Yeomanry and Volunteer Forces to full established proportions, at the same time materially raising the standard of efficiency.

The one drawback that can be urged to this scheme is the unpopularity of the ballot.

Officers and civilians of all classes who interest themselves in these subjects bring to notice, lament over, and suggest, partial, and, as a rule, ineffectual remedies for the numerous shortcomings of the Militia, Yeomanry, and Volunteers, all alike admitting that the only panacea for all and everything is resort to the ballot; while, if my information be correct, I understand that Lord Cardwell went so far as to include provisions for the ballot, which he afterwards struck out, in his Militia Bill of 1871; but all shrink from introducing it; not because it will cost money, not because it will in any possible way fall short in effecting the desired results, but because it may or will be unpopular, because they consider the nation is not prepared for it. Under these circumstances we are justified in asking, "When will the nation be prepared for the ballot?" The answer is simple enough; not until invasion is at the door, until foreign troops are embarking for a descent upon our coasts; a line of action the madness of which should be unceasingly brought to prominent notice by every individual in any way concerned with the safety of the country.

It cannot be too clearly understood that the nation is placing its reliance on forces which are not, and never can be (owing to their organization), in a forward condition of preparedness.

Since the beginning of the century gigantic strides in readiness for war have been achieved by the armies of the larger European States

and by our own, but while foreign Powers carry these reforms throughout their whole forces, we stop short of our Militia, Yeomanry, and Volunteers. These with us, it may be said, stand, with the exception of a change in weapon, where they stood at the commencement of the century, the Militia, owing to relaxation of the ballot rules, may even be considered to have gone back in its completeness and efficiency for immediate service, and nothing that Military or Militia Officers can do will be of any avail to raise their condition much above what it now is and has for years past been, unless the organization be altered.

This ballot, too, which it is proposed to introduce, will, as I said before, on inquiry, be found to be far less irksome than is imagined.

The Militia force is at present kept up to three-quarters of its establishment in Officers and men by the present inducements, none of which would be abated or reduced, voluntary enlistment continuing as before, while more work in the non-training season and a shorter annual training would be expected from the rank and file; recourse only being had to the ballot in the case of deficiencies, and that, in the county, to complete its own quota.

Voluntary enlistment and a partial ballot would be able to, and would, I feel confident, work successfully and harmoniously side by side; the community would suffer in an infinitesimal degree, if at all, and the nation would be a material gainer.

Colonel the Earl of WEMYSS, A.D.C.: I think we are greatly indebted to Major Anderson for having brought this vital subject before the Royal United Service Institution. I regret that it has been done in Ascot week, because the attractions of the racecourse I have no doubt have thinned these benches, and I think it is worth the consideration of those who have charge of this Institution as to whether another year it would not be better not to have so important a paper as this read in the middle of Ascot week. I do not think that one can very well exaggerate the importance of this question. Major Anderson in his paper has touched upon many points which I shall avoid, questions of detail as to height, chest-measurement, shooting, and various other things which are wholly independent of the question of the ballot. With reference to that question, which is the important consideration before us, there is much with which I agree in what Major Anderson has said. For instance, the state of our military organization, whether you look to the supply of men in the Army or the Militia, or to the comparative inefficiency of the Volunteers, is thoroughly unsatisfactory. When Lord Cardwell introduced his Reform Bill in 1871, I recollect making a very strong speech against it in the House of Commons, and I venture to say this new system, which was to remove from us for ever anything of the fear of invasion, was simply being founded upon quaking bog and shifting quicksand in the absence of the ballot. And so it has proved. We were promised a reserve of 80,000 men by the year 1880, but we have nothing of the kind. I do not believe you have more than 40,000 men in the Army reserve at the present time. As Major Anderson has pointed out, the Militia is our backbone, but as I have often expressed it, it is in an invertebrate condition, being always 30,000 short, while the boys you see running about in red coats are not those to whom anybody would like to entrust the defence of our hearths and homes. General Peel when he established the Militia reserve intended, not that they should be taken out of the Militia, but that for every man who volunteered from the Militia to the Militia reserve the Officer in command should be empowered to raise another. So much for the importance of the ballot as regards those effects. I believe the ballot is really the only remedy for the present military organization, and till you have that as the

foundation of your military system, it is a matter founded upon sand and will never be satisfactory. Major Anderson has spoken of the way in which he would apply the ballot, and there I venture to differ with him. I thoroughly agree as to its necessity, but I think it might be applied, and I know that is the view taken by General Erskine, in a very much less onerous way than is proposed by Major Anderson. When Lord Cardwell put the ballot in the Bill to which I referred, which he subsequently struck out because of the difficulty in passing the abolition of purchase for the Officers, those who fought it in the House of Commons did not do so on account of the Officers, but simply because we believed it was the wrong end of the stick, and because it was the ballot that they ought to have laid stress on and not the abolition of purchase. We know that purchase Officers could have been trained up to any degree of efficiency, and therefore it was really throwing dust in the eyes of the British public to try and make them believe that the abolition of purchase could increase the efficiency of the Army, the really important thing was the ballot, but it was not to enforce the ballot. The object of Lord Cardwell's Bill was to simplify the machinery of the ballot, the ballot had not been in force for years; it was to simplify the machinery, that was all, and even with the simplified machinery it was calculated that it would take at least three or four months before you could get a single man. That was the reason why we opposed Lord Cardwell's Army Bill. Now can the ballot be applied less harshly than is proposed by Major Anderson? I venture to think it can. I object to the ages which he proposes, I object to the time of service, I object to substitutes, I object to qualifications, and there is one exemption which I object to very strongly, that is the exemption of "peers of the realm." I think they would be glad to take their share, and as one, I repudiate the exemption as far as I myself am concerned, though I am sorry to say I am past even the ballot age as fixed by Major Anderson. Major Anderson proposes that every boy from eighteen up to forty should be liable to be struck for the Militia. I have often spoken on this Militia question; I brought it two or three times before the House of Commons, and before the House of Lords I have spoken of it many times. In doing so all I have ever asked for the ballot has been this, that at the age of twenty every Englishman should be liable to serve his country in some shape or other. My exemptions would be exemptions of service and service only, except professional men such as clergymen and Government Officers who are also serving in another form, that unless a man when he attains the age of twenty can show that he is serving already in the Army, Volunteers or Yeomanry, and that he has engaged to serve 3, 4 or 5 years with those forces, he shall then be liable to be struck once in his life for the ballot for the Militia. That is all; there should be no substitutes, the only substitution would be another kind of service. I think there is a strong feeling that money exemption would not be desirable, and that if you have men who are liable to serve that they should serve in person in some form or other. General Erskine had a very good suggestion when he was at the War Office, a very simple way of applying the ballot. I believe at present under the Militia Law, beside the force annually voted of 140,000 men, there is power also to raise 60,000 more, and General Erskine's proposal was that these 60,000 men should be raised by ballot gradually, in five or six years, 10,000 a year, but that they should be simply there and not called out, that you would have them in hand. In that way the people would get gradually accustomed to it, and it would be no hardship upon anybody; they should be liable during the term of their five years to be called out for training if necessary. In that way you would have 60,000 men ready to put your hands on without having to wait months and months to get them and then begin to train. That seems to me to be a very practical and simple way of dealing with this question. As regards the effect of the ballot upon the Volunteer service there is no question about it; you could then do anything you liked with the Volunteers, if they did not fulfil the full conditions required of them, if they were not engaged to serve three or five years. Any man who failed, even though he had passed the age of twenty, to fulfil all the conditions of efficiency in any one year ought to be balloted for the next year, and with such a screw as that on both the Yeomanry and Volunteers there is nothing in the world you could not make of that force, which comprises upon the whole a superior class of men to those found in the Militia. I have nothing further to trouble you with except to say this,

that I hold the first duty of citizenship to be to defend your country. That is your birthright, and with all the blessings of our island home the first duty of an Englishman is to defend his country. We hear a great deal about the German and another Continental military systems; I think the old English military system of last century is absolutely and entirely sound if properly applied. You may talk about "conscription." The ballot is not universal conscription. You could not go for universal conscription, to take men from their homes in this country and send them out to India and Timbuctoo. Englishmen are very fortunate as compared with other nations that so little is required of them in the way of compulsory service, but that they should be compelled to serve in some form or other is only right. Do not forget this, the ballot really is a great privilege and a boon, for instead of every man, which is the theory of the English military system, being bound to serve when called upon, it gives the population a chance of escape and the lot only falls upon a few. Therefore the ballot instead of being a hardship is really a boon, and I maintain as applied in the more moderate way that I venture to suggest instead of the more stringent way proposed by Major Anderson it would not be unpopular. No man who has had anything to do with public life, who knows anything of Army or Navy matters, can fail to know this, no man who has ever held the position of a Commander-in-chief will not tell you in private that the foundation of the Army and our Militia rests on the ballot. No Secretary of State would refuse to tell you the same thing only they are afraid of Parliament. A Conservative Secretary of State who brings in the ballot is afraid lest there should be the cry of "coercion" in another form, and that the other side will go to the country denouncing this horrible military coercion. It would be just the same on the other side, if the Liberals were to do it I am afraid the others would, and I know with regard to Lord Cardwell, this is an historical fact: that when he was considering what the great military reform of 1871 was to be that was to make this nation for ever safe and free from panic, that although we put in the Bill only the machinery of the ballot, the idea was also to strengthen our new military system by establishing the ballot. I was going to give a notice in the House of Commons upon the subject, and Lord Sandhurst, then commanding in Ireland, had been called over from Ireland to consult with Lord Cardwell upon the whole military question, and he said to me, "Don't be in a hurry about this, for my hope and belief is that they are really going to establish the ballot." I only wish they had: that is all I have to say.

Major McDONNELL (late 19th Middlesex Rifle Volunteers): After the able speech from Lord Wemyss, I need not make any remarks on the general questions raised by Major Anderson, but there are one or two points of detail on which I should like to say a few words. In the first place, as to the provision which Major Anderson has made, not without much precedent, for substitutes. I hope this system will never be again recognized in this country. The privilege of getting a man to serve for you by a money payment appears to me to be thoroughly bad, and to have been shown to be bad in other armies. The French Army would have been better in 1870 if the system of substitution by money payment had not existed, and certainly the opposite system has helped the Germans in bringing their Army to its present marvellous state of efficiency. By the fact that substituted service is absolutely and sternly forbidden they do sweep all classes into the military net; the whole nation is fairly represented in the armed forces, and that enables them to make their military machine more perfect than they otherwise would have been able to do. The value of this prohibition of substitutes is practically recognized by all the great military nations of the Continent. No substitution is allowed now in France, Germany, or Austria, I do not know about Spain or Russia, but I believe not in Russia. I quite admit that there must be some safety valve, that is, some consideration for the value of the time of the more highly educated young men. The Germans as we know have the safety valve of the one-year volunteer system, which is very ingenious and works extremely well. If the ballot were revived in England and substitution absolutely forbidden in England, the effect would be this, that our safety valve would be that the young men who in Germany enter the Army as one-year volunteers, would in our country qualify themselves either as Officers for the different

branches of the auxiliary forces, in which case we might get great efficiency out of them, or they would at the worst go into the ranks of the Volunteers, and by that means you might very greatly raise the standard of efficiency of the force. But if you do allow a man who is drawn for the Militia to buy a substitute, every man who by hook or by crook can scrape sufficient money together will pay a substitute. This is particularly found to be the case in Belgium, where substitutes are still permitted. I heard of a case there the other day in which a friend of mine, a professional man, a doctor, had paid a very considerable sum of money, I think 200*l.*, for his son, a student for the bar, rather than permit him to go through service in the ranks. If it were allowed here you would find the very same thing would occur, the middle classes at any rate would stand aloof—as many of them I am sorry to say do at present stand aloof—even from the ranks of the Volunteers. But if you did not allow that money payment of 50*l.* or 100*l.*, then you could make really efficient fencibles or militiamen or whatever you pleased of them; and you could raise the standard of the education of your Officers in a way that you never will be able to do till you have some form of compulsion. I hope if the country has the courage to adopt compulsory service, it will also have the courage to say that neither peers of the realm nor any other persons shall be competent by money payment to escape the balloting and actual personal service. To go to another point. In the first part of the lecture Major Anderson drew a comparison between the condition of France at the latter part of the war of 1870-76, and England after an invader had gained a foothold here. He said: "We need, for an illustration of the fate of such unpreparedness, go no farther than the campaign of 1870-71, where we saw the fairest provinces of France devastated by war, nobles and peasants alike sacrificing their lives as simple volunteers in the ranks, in a fruitless endeavour to retrieve what want of organization and preparation on the part of the State had entailed on their beloved country. Such would be the case with England if invaded by hostile foes; thousands of all classes would gladly and proudly volunteer their services, but they would be but a courageous armed mob, with whom it would be practically impossible to achieve anything, owing to want of previous training, and they would be annihilated by regular troops, as were the Garde Mobile of France by the organized forces of the German Empire; while money would be made to flow like water, to, if possible, remedy what would then probably be irremediable." I do not think these are quite parallel cases, because the French had only untrained levies at that time, and their territorial organization for those levies was interrupted by the outbreak of the war. But our untrained levies would at any rate have the Volunteer organization to receive them as it were, and mould them into shape, every man would have some *cadre* to fall into. I believe, therefore, that our last line of defence would be a better fighting machine, though not a more gallant one, than the French levies of 1870.

Lieut.-Colonel GAERNHAM (late 3rd Battalion West Riding Regiment): As a witness before the Committee of 1876, I wish to say a few words. I remember being asked the question as to what I thought of this question of balloting for the militia, and my answer was I thought it was one which concerned the statesman more than the soldier, because the soldier could only have one opinion on the subject, which was that it was the most important thing for the military organization of the country. I therefore am pleased to find that this subject has been so ably brought forward by Major Anderson, who is not a Militia Officer, but an Officer serving in the active army. I am delighted as an ex-Militia Officer to find that such interest exists in a lively way amongst Officers who are serving. There can be no doubt of the importance of the ballot to the Militia, and through the Militia, as Lord Wemyss has said, to the Volunteers. With respect to the Militia, it would be invaluable because it would in the first instance remove any difficulties on the part of employers of labour. I have had men come to me in my regiment who gave up 30*s.* a week for the pleasure of serving for their month in the Militia. They had to go back again to a very much lower rate of wages, their places were not kept open for them, and they did it for the pleasure of serving. See how it would help those men if the master himself knew that it was a good thing for him to have a certain number of his hands in the Militia. I happen to have served in a Yorkshire regiment where we depended a great deal upon mill

hands—see how it would assist in protecting the master of a mill from the chance of being drawn for the Militia, if a number of his men voluntarily served in it. And I think one of the best parts of the scheme propounded by Major Anderson is that the present voluntary system should go on. I quite agree with Lord Wemyss in thinking that the ballot might be so worked as to be in no way oppressive to the working population of this country, but there is this difficulty in all questions relating to the Militia, namely, the very different circumstances under which Militia regiments are raised and serve. I remember General Herbert in a letter which he wrote to me upon Militia matters saying that, and of course in some districts it would be very much more difficult than in others, and the ballot would press upon a different class of men. In the manufacturing districts it is a question of trade whether you get the men; if trade is brisk you have to go into the market to tempt them. In the agricultural districts it might press more severely upon persons in better positions of life, but I am convinced myself it only requires to have a statesman who is bold enough to bring the ballot forward and the thing would be done. In the meantime it is most useful that it should be brought forward here, and I quite agree with what Lord Wemyss has said. The only comment I can in any way make on the subject of the lecture is, that I think the details may to a certain extent obscure what is the really important question to keep before the public, that is, the great question of the necessity for the ballot in the Militia. We cannot settle those details now. If we were discussing those details I could make many remarks, but I quite agree that it is only necessary to look at the principle, which is, that the Militia requires help. What the need for that help is only those Militia Officers who have served in every rank, as I have done, can know, they alone can know what it is to come into this Institution as I have come time after time to hear excellent suggestions made by Officers of experience, and to know that when they walked out of the doors, they were obliged to shut off any hope of those suggestions being carried out owing to the question of money. I remember an ex-Financial Secretary of the War Office, Colonel Loyd-Lindsay, presiding here; a good many Officers had made some very valuable suggestions, I had made one very humble one, and he said, "The only suggestion that there is any chance of being carried out is the one made by Colonel Garnham," not because it was the best, but simply because it happened to be the one which did not require any money. Now this is one which does not require money. It is certain that a system of conscription in an industrial country like England would be fatal. Much as the soldier must admire the system in Germany, there is no doubt it is sapping the very vitals of that country, the way in which every man has to devote a considerable portion of his time and service to his country is and must be detrimental, that is a known fact, independent of our Colonial service, which would make conscription an impossibility. But I fail to see a difficulty in really raising the few thousands more that we want to complete our Militia. It is not only raising the numbers, it is strengthening the hands of the authorities, and what we want to do with respect to the Militia is to raise its tone, to make it as military as possible, and to get rid as far as possible of that cursed question—excuse the strong word because it really is a real curse to the Militia—the question of money. You want a range, you cannot get it because it costs money; you want men, you cannot get them because wages are higher. We have money before us as a difficulty in everything. The ballot would level a great many of these difficulties. I do not agree with the lecturer in thinking that the expense of the Militia would be reduced, because I do not think less training or less anything in the way of cost would result from it; but the force, the power which you would exercise would make your service three times as efficient. You would have a greater hold upon your men, you would get men of a better class, you would in every way have a greater pick; but as to reducing expenses there I must differ, because the only way in which the Militia service can be efficient is by increasing the facilities for improving it, notably in that most important question of musketry. Musketry is the first thing to be considered, and unless we have ranges and money at the disposal of the Militia it would be perfectly useless bringing together more men. But by bringing in men with aid of the ballot we should then not be obliged to take the lower class of men who, on some occasions, we are obliged to take now, and we should raise not only

the tone of the Militia but also of the Volunteers, because there are a great many men in the Volunteers now who do not belong to the artizan class. We ought to have these men in the Militia instead of a still lower class, and the more you raise the Volunteers by getting into their ranks the artizans, the more you will in that way send the next lower class of men into the ranks of the Militia. I had for many years the privilege of being on friendly and intimate terms with the Inspecting Officers of Militia, and I was the first to call the attention of the authorities to the fact that men were serving at the same time in the Militia and Volunteers. In my company when I was a Captain, I had twenty-five Volunteers serving who were in the Volunteers at the same time, and it was owing to that representation on my part, that regulations were issued which rendered it almost impossible for them to serve in the two. We are all very much obliged to the lecturer for having brought this subject forward. Matters of detail will have to be left, but what we want is to put support in the House of Commons with reference to this question of the ballot.

Colonel EVELYN, 3rd Battalion East Surrey Regiment: It is very satisfactory to hear a paper so interesting and containing so many important matters respecting the Militia introduced by an Officer of the regular service. I think that the views not only expressed in the lecture but also those which fell from Lord Wemyss, are those which I myself and many others have constantly urged in this theatre, that our military system is good in this country if it were properly carried out, and that instead of introducing the systems of Germany and foreign countries, we ought to try to develop our own system, as it is capable of development. The Militia is the most important of all branches, it is the ground of the whole because it is the only branch of the Service to which the ballot could possibly be applied. A pamphlet which has had a great circulation, and which I believe comes from very high authority, would seem to advise the ballot for the regular Army, but we could not possibly apply that to engaging men to go all over the world. For that reason it is only the Militia to which the ballot in any form could possibly be applied. The three branches of the Service are distinct: we have the Army, which ought to be highly paid, liable to general service; the Militia, which need not be so highly paid, only for home service; and the Volunteers, who theoretically should be men who are able to pay for their own military training. That I think is a point that has been very much forgotten of late, and unfortunately so. I do not like these constant increases in the sum allowed for each Volunteer; I think it will interfere very much with the service of the Militia; and I know that the Volunteers are composed of quite a different class of men to those of which they were composed during the first few years of their establishment, when I took great interest in the Volunteers and worked very hard to get them up. I was looking at a Volunteer regiment the other day. I inspected every man in the regiment carefully, and from the look of them I could see they were of the labouring class, in fact men who served for the sake of the suit of clothes that they got. Instead of that they ought to have to pay for their own clothes, or be liable to be drawn for the Militia. I do not think that unless we keep constantly in view these three points, the Army, Militia, and Volunteers, the one highly paid, the other less paid, and the other unpaid, that the system of the ballot could be applied to the Militia, for if the terms of the volunteer service are made such that labouring men can afford to join, and thereby escape the ballot, few will enrol voluntarily into the Militia, particularly if they see a chance of getting a large payment for joining as a substitute.

Major ANDERSON, in reply, said: Lord Wemyss accuses the paper of being harsh as regards the ballot, but as far as I can gather he proposes to ballot upon everybody, and I must own my only reason for bringing substitutes in at all was to try and lessen the severity of the working of the ballot. We all know the difficulty we have to contend against, that is the difficulty of leading the nation to accept this very ballot. Doubtless foreigners, as Major McDonnell has stated, get very high efficiency, but it is by dragging the nation through fearful difficulties, in fact ruining it in other ways. If this question ever again comes before Parliament, what we must think of will be every possible way in which we can smooth down that harsh word the ballot and the working of it. If we can get the men in any other way by all means let us get them, but what the nation requires is the men,

one way or the other, and the ballot is the last resource. Of course a money exemption is a very bad thing and not to be advocated, not so substitutes, fairly worked out, and I think it would be most unpopular in the country if there was no such provision, especially when we consider that if a man of education could not get into the Volunteers he might be driven to serve in the ranks of the Militia. Of course you might get out of it by the German one-year system, or some provision of that sort; the suggestion as to substitutes was only put forward by me because we find it in George the IIIrd's Ballot Act, and because we must think of every little loophole to make the ballot palatable. As regards the levies which Major McDonnell spoke of, of course we should have a certain organization to attach our rapidly raised levies to if England were invaded, but at that moment, as you will all allow, the Ballot Bill will be put in force and we shall get men who never touched a rifle, who would then be in exactly the same position as regards training as the Garde Mobile of France.

Major McDONNELL: What I said was that these untrained men would have had some kind of organization to fall into, that the recruits would go naturally to the regular volunteer battalion, and that those battalions the French had not got for them to go to, their territorial organization was not complete.

Major ANDERSON: I of course was arguing that the man as he came to us would be but a raw recruit; and as regards the cost of the force, my reason for pointing out that there would be a saving, was because as I mentioned in the Act of George IIIrd, there were 41,000 Militia; we require 142,000, and I cannot help thinking by degrees we could do with a good many less. There would be more Volunteers, the Yeomanry might also be increased, and a corresponding reduction made on the Militia, while if you shorten the Militia service and run the men more quickly into the Reserve, the reduction might be still greater; that is supposing we get the efficiency in a shorter time, I think a saving could be effected in that way.

The CHAIRMAN: I must express my regret that the lecturer having prepared a very able paper has not had a larger audience; however, as Lord Wemyss has said, in the middle of Ascot week we cannot expect anything better. Major Anderson has evidently studied, and studied in a very intelligent way, the great question which should be before the minds of all Englishmen who love their country, that is, whether the military forces of the Crown are adequate to the very great requirements which would be laid upon them in case of hostilities breaking out; and I think he has come to the only conclusion which would present itself to the mind of any thoughtful Officer like himself, and that is that those forces are not adequate. Then like a sensible man he does not stop short with that conclusion, but having established to his own satisfaction, and I think to the satisfaction of all who have listened to his paper, that there are great shortcomings in our military system, he proceeds to propose remedies for the evils which exist, and foremost amongst those remedies is the enforcement of the ballot. I say enforcing the ballot, because by the law of the land the ballot is already in existence, being as you know suspended by an Act of Parliament passed every year. I quite agree with what Lord Wemyss has said—most soldiers do—I do not think I ever met with one that did not—that the ballot is at the foundation of our military system; but unfortunately from the pressure of political circumstances we have never yet had a Government—I say this without respect to party politics—we have never yet had a Government that has had—may I say the courage?—to propose the enforcement of the ballot, and I am afraid we should have to wait many a long day before we see such a phenomenon in this country. However, the defence of the Empire cannot wait for that, and therefore it behoves us all who are interested in the safety of the nation to cast about for means of making the military forces of the country as efficient as possible on the present military system, which is based on voluntary service. Major Anderson has said in regard to home defence that he cannot look upon the Volunteers as the first line of defence. Well, I do not quarrel about the question whether they are the first line of defence or the second or third (it does not matter what order they may be placed in); but I must say that in existing circumstances,—in case of an invasion of this country, we should have to depend very materially upon our citizen army, and that citizen army is already in a very fair state of efficiency

for the purposes for which it was intended. It has this admirable feature in its organization, that it admits of almost indefinite expansion. Now I wish to guard myself against being understood as saying anything in disparagement of the Militia, for I have the highest opinion of its value, and I quite assent to what has been said in regard to its being the backbone of the military forces of the Crown, but in speaking of the Volunteers, I think that in existing circumstances we should be careful to foster them in every way possible, and it is highly to be lamented that they have not had greater encouragement than is given to them at the present time. It requires the expenditure of a very small sum in addition to which they already receive to make the force much more valuable than it is. We want a volunteer reserve, and we should raise corps representing the different departments of the Army, such as Transport Corps, Medical Staff Corps, Commissariat Corps. All that might be done without adding scarcely a penny to the estimates. Then, again, there should be a great improvement in the musketry instruction. We should have the musketry instruction of Volunteers made a reality, which it hardly is at present. Of course we see that there an expenditure of money would be required, but whatever is required for the force should be given cheerfully by the Government, and it is a very poor policy that refuses to do this. We can only hope that the question of the ballot will come up at some future time, but as things stand at present we must be content with voluntary service being the foundation of our military system. It is very easy, however, for every one of us to foresee that circumstances might arise to necessitate a resort to the ballot; and, therefore, I think Major Anderson deserves well of his country for having brought this question forward for consideration, and I am sure that I shall be acting in accordance with the sentiments of all here present when I tender to him the expression of our cordial thanks for the very important paper he has read to us.

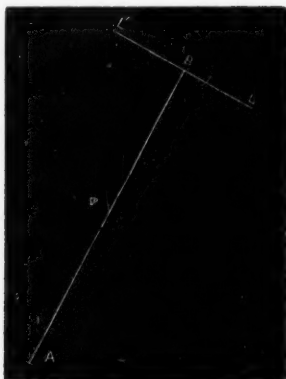
TO FIND THE DEVIATION OF A RIFLE BULLET DUE TO THE ROTATION OF THE EARTH.

By J. H. C. DALTON, B.A., Trin. Coll., Cambridge.

LET A denote the firing-point.

B the centre of the target.

LBL' a horizontal line on the target.



For the purposes of this problem we may consider A and B to have the same level, and the earth itself to be a sphere.

Let the radius of this sphere be a .

Let λ, l be the latitude and longitude of A;
and $\lambda + d\lambda, l + dl$ „ „ B:

the positive direction of measurement being to the north and east respectively.

Let R denote the range AB.

Let α denote the inclination of the target to the east, the direction BL being the positive direction of the target.

Let w denote the angular velocity of the earth about its axis; and t the time of flight of the bullet.

We see—

$$\begin{aligned} R \cos \alpha &= \text{resolved length of range north and south} = ad\lambda, \\ R \sin \alpha &= \text{„ „ „} = a \cos \lambda dl \quad (1.) \end{aligned}$$

On account of the rotation of the earth, the points A and B are moving with velocities $a \cos \lambda \cdot w$ and $a \cos (\lambda + d\lambda)w$ in the direction west to east; if, therefore, we wish to determine the effect of the earth's rotation on a bullet travelling along AB, we must first determine the velocity of B relative to A; this, multiplied by the time of flight (t) will give the motion of B relative to A during the passage of the bullet; and, therefore, if we reverse this motion, we shall get the displacement of the bullet on the target.

Since the velocity of B to the east is $a \cos (\lambda + d\lambda) \cdot w$ and of A $a \cos \lambda \cdot w$, the relative velocity of B with respect to A is compounded of a velocity $a \cos (\lambda + d\lambda) \cdot w$ to the east at B and $-a \cos \lambda \cdot w$ to the east at A, and the angle between these two directions is obviously equal to $d\lambda$, the difference in longitude.

Hence, resolving along the tangent and normal to the circle in which B rotates about the axis of the earth; we get respectively,

$$\begin{aligned} \text{Along tangent } \{a \cos (\lambda + d\lambda)w - a \cos \lambda \cdot w\} \cos d\lambda &= -a \sin \lambda w d\lambda, \\ \text{Along normal } a \cos \lambda \cdot w \sin d\lambda &= aw \cos \lambda \cdot d\lambda. \end{aligned}$$

This latter direction will be downwards in the perpendicular from B on the axis of the earth. Hence resolving it along the north and upwards, we get—

$$\begin{aligned} \text{Velocity northwards} &= aw \cos \lambda d\lambda \sin \lambda = aw \cos \lambda \sin \lambda d\lambda, \\ \text{,, upwards} &= -aw \cos \lambda d\lambda \cos \lambda = -aw \cos^2 \lambda d\lambda. \end{aligned}$$

Hence from (1) we get—

$$\begin{aligned} \text{Velocity of B relative to A.} \quad \text{Eastward} &= -wR \cos \alpha \sin \lambda. \\ \text{Northward} &= +wR \sin \alpha \sin \lambda \quad (2). \\ \text{Upward} &= -wR \cos \alpha \sin \lambda. \end{aligned}$$

Since the time of flight is t , the motion of B during this time t (provided t be small) will be composed of these three quantities (2) multiplied by t . If, therefore, we wish to find the displacement of the bullet on this time t , we must reverse the motion; that is, we get—

$$\begin{aligned} \text{Displacement of bullet eastward} &= Rwt \cos \alpha \sin \lambda. \\ \text{,, ,, northward} &= -Rwt \sin \alpha \sin \lambda. \\ \text{,, ,, upward} &= Rwt \sin \alpha \cos \lambda. \end{aligned}$$

To find where the bullet will be on the target (on the supposition it would arrive at B in the time t , if the earth did not rotate) we must resolve along the target.

We get at once—

$$\begin{aligned} \text{Displacement to right of target} &= Rwt \sin \lambda (\cos^2 \alpha + \sin^2 \alpha) = Rwt \sin \lambda. \\ \text{,, upward} &= Rwt \cos \lambda \sin \alpha. \\ \text{,, forward} &= Rwt \cos \alpha \sin \alpha \sin \lambda - Rwt \sin \alpha \cos \alpha \sin \lambda \\ &= 0. \end{aligned}$$

That is—

$$\text{Displacement of bullet to right} = Rwt \sin \lambda \quad (\text{A}).$$

$$\text{„ „ upward} = Rwt \cos \lambda \sin \alpha \quad (\text{B}).$$

$$\text{„ „ forward} = 0 \quad (\text{C}).$$

From these we deduce—

(1.) The time of flight is always unaltered. This we also see from the fact that the distance AB remains constant.

(2.) The lateral deviation is always equal to $Rwt \sin \lambda$, no matter what the direction of the range is. Hence we see for the same distances it varies as the sine of the latitude, and is to the right on the northern and to the left on the southern hemisphere; being zero at the equator.

(3.) The vertical deviation is always upward when the targets are more easterly than the firing-point; and the maximum deviation is when the range is due east and west, being then equal to $Rwt \cos \lambda$. Hence the greatest possible vertical deviation is at the equator. This deviation is zero always at the poles and also in any range due north or south.

Numerical Calculations.

Example 1.—The latitude of Wimbledon is $51^{\circ} 25'$. To calculate the lateral deviation of a bullet at 1,000 yards, the time of flight being supposed three seconds. Let δ denote the displacement.

We have shown—

$$\delta = Rwt \sin \lambda.$$

Take a second the unit of time, and 1 inch the unit of length—

$$\text{Then } R = 36000 \quad w = \frac{2\pi}{24 \times 60 \times 60} \quad t = 3 \quad \lambda = 51^{\circ} 25' \\ \pi = 3.14159$$

Hence—

$$\delta = \frac{36000}{12 \times 3600} \quad 3 \cdot \pi \sin \lambda = \frac{25}{10} \pi \cdot \sin \lambda,$$

Therefore—

$$\log \delta + 10 = \log 25 + \log \pi + L \sin 51^{\circ} 25' - \log 10.$$

Now—

$$\begin{aligned} \log 25 &= 1.39794 \\ \log \pi &= 0.4971509 \\ L \sin 51^{\circ} 25' &= 9.8930412 \\ \log 10 &= 1 \end{aligned}$$

Hence—

$$\begin{aligned} \text{Log } \delta &= 0.7881321 \\ \therefore \delta &= 6.14 \end{aligned}$$

That is, deviation is 6.14 inches to the right.

Note.—This result is correct to about $\frac{1}{10000}$ th of an inch.

Example 2.—Calculate the maximum vertical derivation of a range as in *Example 1*.

This will be when the range faces east or west.

Here $\alpha = 0$ or π .

Hence deviation is—

$$= Rwt \cos \lambda$$

$$\text{i.e., } \delta = Rwt \cos \lambda$$

$$= 3600 \cdot \frac{2\pi}{24 \times 60 \times 60} \cdot 3 \cdot \cos 51^\circ 25' = \frac{25}{10} \pi \cos 51^\circ 25'.$$

Hence—

$$\log \delta + 10 = \log 25 + \log \pi + L \cos 51^\circ 25' - \log 10.$$

Now—

$$\begin{aligned} \log 25 &= 1.3979400 \\ \log \pi &= 0.4971500 \\ L \cos 51^\circ 25' &= 9.7949425 \\ \log 10 &= 1 \end{aligned}$$

Hence—

$$\log \delta = 0.6900325.$$

Hence—

$$\delta = 4.9 \text{ inches.}$$

Example 3.—To find the horizontal and vertical displacement of the bullet on the 1,000 yards range at Wimbledon.

Given inclination of range is to the north-west, making an angle of $70^\circ 20'$ with the north.

Here we have $\alpha = -70^\circ 20'$.

Therefore—

$$\begin{aligned} \text{vertical deviation} &= Rwt \cos \lambda \sin \alpha \\ &= - Rwt \cos 51^\circ 25' \sin 70^\circ 20'. \end{aligned}$$

If therefore δ denote the numerical deviation,

$$\log \delta + 20 = \log 25 + \log \pi + L \cos 51^\circ 25' + L \sin 70^\circ 20' - \log 10.$$

Now

$$\begin{aligned} \log 25 &= 1.3979400 \\ \log \pi &= 0.4971500 \\ L \cos 51^\circ 25' &= 9.7949425 \\ L \sin 70^\circ 20' &= 9.9738971 \\ \therefore \log \delta &= 0.6639296 \end{aligned}$$

Hence—

$$\text{vertical deviation} = -4.61 \text{ inches,}$$

that is it is downwards, and equal to 4.61 inches.

And—

Horizontal deviation we have seen in Example 1 is 6.14 inches to the right.

We will next determine the correction in elevation and windage necessary to keep the bullet in its right place.

Let θ denote the circular measure of and n the number of minutes in the small angle of elevation (or windage) necessary to correct a small vertical (or horizontal) displacement on the target.

We have at once if δ denote a displacement—

$$\delta = R\theta = R \frac{n}{60} \frac{\pi}{180}$$

$$\therefore n = \frac{60 \cdot 180}{R} \delta.$$

Hence, if n_t denote the number of minutes of elevation, n_w the number of minutes of windage required to counteract the vertical and lateral deviation,

We have—

$$\begin{aligned} n_t &= \frac{60}{R} \cdot \frac{180}{\pi} \cdot Rwt \cos \lambda \sin \alpha. \\ &= \frac{60}{R} \cdot \frac{180}{\pi} \cdot R \cdot \frac{2\pi}{24 \times 60 \times 60} \cdot t \cos \lambda \sin \alpha. \\ &= \frac{1}{4} t \cos \lambda \sin \alpha. \\ n_w &= \frac{60}{R} \cdot \frac{180}{\pi} \cdot Rwt \sin \lambda. \\ &= \frac{60}{R} \cdot \frac{180}{\pi} \cdot R \cdot \frac{2\pi}{24 \times 60 \times 60} \cdot t \sin \lambda. \\ &= \frac{1}{4} t \sin \lambda. \end{aligned}$$

From this we see—

The amount of correction required is independent of the length of the range, depending only on the time of flight of the bullet; that is, if a bullet from one rifle at 1,000 yards were to arrive at the target in the same time as a bullet from another at 800 yards, the same correction would be required for both the rifles at their respective distances.

Example 1.—Find the windage correction for any range at Wimbledon, for a rifle, assuming the t time of flight to be three seconds.

We have at once—

Correction in minutes = $-\frac{3}{4} \sin 51^\circ 25' = -0.53'$ (about $32''$), i.e., we must put on $32''$ of windage to the left.

Example 2.—Find the elevation correction for a range parallel to the 1,000 yards at Wimbledon, the time of flight being the same.

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The direction of the range is supposed to be the same as in example (3).

We have—

$$\begin{aligned}\text{Correction in minutes} &= \frac{3}{4} \cos 51^\circ 25' \sin 70^\circ 20', \\ &= 0.42 \text{ (about } 25''),\end{aligned}$$

i.e., we must put on 25'' of elevation.

OCCASIONAL PAPER.

This portion of the Number is reserved for Articles, either Original or Compiled, on Professional Subjects connected with Foreign Naval and Military matters; also for Notices of Professional Books, either Foreign or English.

It is requested that communications or books for review may be addressed to Colonel Lonsdale Hale, at the Royal United Service Institution, Whitehall Yard, London, S.W.

THE ENGINEER ARM IN CONTINENTAL ARMIES.

By Capt. W. A. H. HARE, R.E., D.A.Q.M.G.

THE AUSTRO-HUNGARIAN EMPIRE.

INTRODUCTORY.

In the Austro-Hungarian Army the Engineer arm of the service is, for some unaccountable reason, separated into two branches, styled "Engineers" (*Genie Waffe und Genie Truppe*), and "Pioneers" (*das Pionnier Regiment*). The Engineers consist of a Corps of Engineer Officers (*Genie Waffe*) and 2 Regiments (*Genie Truppe* or *Genie Regimenter*) officered from it, and the Pioneers consist of a single Regiment.

Though the duties of these two branches are in many ways so alike, in some cases in war indeed precisely the same, they are nevertheless kept perfectly distinct. Engineer Officers are supposed to undertake the construction and maintenance of all military works and buildings in peace, and in war the Engineer Corps would have to undertake all works connected with the attack and defence of fortified places, fortification in all its branches, demolitions, the construction, repair, and maintenance of roads, bridges, railways, &c., and technical works connected with camps and cantonments; whereas the Pioneer Regiment is supposed to undertake in war bridging in all its branches, demolitions on a small scale, the construction, repair, and maintenance of roads, railways, &c., field fortification, and the water supply of field-works.

The only thing to be said is that it is difficult to conceive how such a dual system should have so long survived the constant reorganization through which the Austrian Army has passed, and there are as yet no signs of its being interfered with.

There is another branch, which may be called an Engineer service, and which was until recently undertaken by both the Engineers and Pioneers, and that is the Railway and Telegraph Regiment. It is now a distinct service, and has been fully described in vol. XXIX (1885), No. CXXVIII, p. 257 of the Journal.

Before going any further, it will be well to give a slight sketch of the Austro-Hungarian military organization.

The territory of the Austro-Hungarian Empire, which was formerly divided into 16 Military Commands, differing all in size and importance, is now divided into 15 Army Corps Commands and one independent Military Command (Zara for Dalmatia). Of these 15 Army Corps, 8 are recruited in cis-Leithian, and 6 in trans-Leithian Provinces, in other words, 8 may be said to be Austrian, and 6 Hungarian. The 15th Army Corps, comprising both Austrian and Hungarian elements, is stationed in Bosnia and Herzegovina.

This territorial organization of the Austro-Hungarian Army is supposed to be based on questions of recruiting and the grouping of Brigades and Divisions.

On mobilization, each Army Corps Territorial District is supposed to form an Army Corps complete in all respects from the troops quartered in its rayon, with some slight exceptions.

The following are the Headquarters and Territorial Districts of the various Army Corps :—

Army Corps.	Headquarters.	Territorial Rayons.
1st.....	Cracow.....	Western Galicia.
2nd	Vienna.....	Upper Austria, Lower Austria, and Salzburg.
3rd	Gratz	Styria, Carinthia, Carniola, Istria, Trieste, Goritz, and Gradiska.
4th	Buda-Pesth...	Hungary.
5th	Presburg.....	Hungary.
6th	Kaschau	Hungary.
7th	Temesvar.....	Hungary and Banat.
8th	Prague	Western Bohemia.
9th	Josephstadt...	Eastern Bohemia.
10th	Brünn	Moravia and Silesia.
11th	Lemberg	Eastern Galicia and Bukovina.
12th	Hermannstadt	Transylvania.
13th	Agram	Croatia and Slavonia.
14th	Innsbruck ...	The Tyrol and Vorarlberg.
15th	Serajevo	Bosnia and Herzegovina.

The Military Command of Zara has its Headquarters at that place, and comprises Dalmatia.

The number of Infantry Divisions, Cavalry Divisions or Brigades, Artillery Brigades, and Battalions of Engineers or Pioneers, varies, however, in each Army Corps district, and thus the territorial organization of the Austro-Hungarian Army is seen at a glance, without going into detail, to be by no means so perfect as the German, from which it is copied.

Confining our remarks in the present article to the Engineer Arm, we find that instead of each Army Corps having its own Engineer or Pioneer Battalion, or whatever we choose to call it, permanently quartered in peace in its own rayon (or at any rate very near it), and permanently belonging to it in peace or war, as is the case in Germany, in Austria the Engineers and Pioneers have no such connection, and what makes it worse is that both these branches are necessary, according to Austrian ideas, in a complete Army Corps on a war footing. Thus 2 Battalions of Engineers are quartered in the 1st Army Corps district; 3 Battalions of Engineers and 2 of Pioneers in the 2nd do.; 1 Battalion of Pioneers in the 3rd do.; 2 Battalions of Engineers in the 4th do.; 1 Battalion of Pioneers in the 5th do.; 1 Battalion of Engineers and 1 Battalion of Pioneers in the 8th do.; 2 Battalions of Engineers in the 10th do.; and none in the 6th, 7th, 9th, 11th, 12th, 13th, 14th, and 15th Army Corps districts or the Zara Command.

The Permanent Headquarter Staff of an Army Corps (*Corps-Commando*) comprises in the first place the *Feldzeugmeister*, *General de Cavallerie*, or *Feldzeugmeister-lieutenant* in command, his aide-de-camp (*Personal Adjutant*), and the Chief of the General Staff. The Staff itself is divided into 2 Branches. The first, the Military Branch (*Militär-Abtheilung*), consists of 6 or more Officers of the General Staff or Officers attached, under the presidency of the Chief of the General Staff; and the second (the *Hilfsorgane*, or advising heads of Departments), comprises the Director of Artillery (*Artillerie-Director*, a Colonel, as a rule, of the Artillery Staff), the Commanding Engineer (*Genie-Chef*, a Colonel, as a rule, of the Engineer Staff), the Judge Advocate (*Justiz-Referent*), the Principal Medical Officer (*Sanitäts-Chef*), the Chaplain (*Militär-Pfarrer*), and the Chief of the Intendanz (*Intendanz-Chef*).

Of the 15 Army Corps that exist in peace, 3 only, viz., the 2nd (Vienna), the 3rd (Graz), and 15th (Serajevo), have three Divisions, as laid down for the Army in the Field; the remainder, with the exception of the 14th (Innsbruck) which has only 1 Division, and the Zara Command which has a special formation of its own, have only 2 Divisions each, and no doubt in case of war would receive each a Landwehr or Honved Division.

The first 13 Army Corps would be formed, in all probability in case of hostilities on a large scale, into 3 Armies. One of these would probably have 5, and the other two 4 Army Corps each. The 14th Army Corps, intended for the defence of the Tyrol, would be organized for mountain warfare, and would comprise two Divisions, one of regular troops and the other of *Landesschützen* (Tyrolese Reserve). The 15th Army Corps and the troops of the Zara Command are not supposed to form part of the mobilized Field Army, but are intended for the local defence of Bosnia, Herzegovina, and Dalmatia.

The Generals Commanding the 3rd (Graz), 4th (Buda-Pesth), and 8th (Prague) Army Corps are of very high rank, and would take command of the three Field Armies that would be formed. They are styled *Corps Commandant und Commandirender General*, and have *Stellvertreter*, or Generals second in command under them. The latter would take command of the Army Corps on mobilization.

The troops that would be comprised in the "ordre de bataille" of the mobilized Field Army are for the greater part grouped in peace in Divisions.

There are nominally 31 Infantry Divisions with permanent Headquarters in peace, numbered from 1 to 36. Nos. 20, 21, 22, 23, and 26 do not exist in peace, and would only be formed on mobilization with Landwehr and Honved troops. 12 entirely new Divisions would also be formed on mobilization; 2 of these only would be of regular troops,¹ 9 would be of Landwehr or Honved troops, and 1 (the 48th) of *Landesschützen* of the Tyrol and Vorarlberg.

The total number of Infantry Divisions available in case of war would then nominally, at any rate, be 48.

The cavalry of the 1st and 11th Army Corps only are formed in Cavalry Divisions. The remainder are in Brigades.

An Infantry Division consists as a rule of two Brigades. Divisions intended for mountain warfare comprise 3 or 4 Mountain Brigades. Cavalry Divisions are of two Brigades each.

On a war footing an Infantry Division would consist of—

- a. A Divisional Staff (*Truppen-Divisions-Commando*).
- b. 2 Brigade Staffs.
- c. 2 Rifle or Infantry Battalions.

¹ These, the 44th and 47th Divisions, were actually mobilized in 1882 for the suppression of the insurrection in Dalmatia and Herzegovina.

- d. 12 Infantry Battalions (in two Brigades).
 - e. 2 to 4 squadrons of Cavalry.
 - f. A Battery division (4 Batteries).
 - g. A company of Engineers ;
- with a nominal fighting strength of some 13,000 bayonets, 600 sabres, and 24 guns.

A Cavalry Division consists of 2 or 3 Cavalry Brigades, or from 4 to 6 Regiments, with a division of Horse Artillery (2 Batteries).

An Army Corps would comprise—

- a. An Army Corps Staff (*Corps-Commando*).
- b. 2 or 3 Infantry Brigades complete.
- c. A Cavalry Brigade.
- d. The Corps Artillery (2 Battery divisions).
- e. The necessary number of Pioneers¹ and Bridge Trains, as a rule a Company with 2 Bridge Trains (*Kriegsbrücken-Equipagen*) and an Advanced Guard Bridge Train (*Vorhut-Brücken-Train*).

The Cavalry Brigade would furnish the Divisional Cavalry.

This is omitting such details as Staff escorts, trains, ammunition columns, &c., &c.

PART I.—THE ENGINEERS.

THE CORPS OF ENGINEER OFFICERS.

Organization.

The Officers of the Corps of Engineers, called in Austria the *Genie Waffe*, are all borne on one list, comprising General Officers, Colonels, Lieutenant-Colonels, Captains, Lieutenants, and Cadets, under an Inspector-General of Engineers (*General-Genie-Inspector*). The Major-Generals (9) are, with the exception of two employed at the War Ministry, all Commanding Engineers of Army Corps. The Field Officers and Captains (First and Second Class) are shown as either belonging to the Engineer Staff (*Genie Stab*), or doing duty with the Engineer Regiments. Below the rank of Second Class Captain all Officers belong to the Regiments.

The *Stab* comprises besides the Generals, some 20 Colonels, 21 Lieutenant-Colonels, 21 Majors, 66 First Class Captains, and 20 Second Class Captains. The Regimental Officers comprise 2 Colonels, 4 Lieutenant-Colonels, 8 Majors, 52 First Class Captains, 32 Second Class Captains, 166 First Lieutenants, 228 Lieutenants, and 5 Cadets, including Officers in the Reserve.

The total number of Officers in the corps is given in the Army List of 1885 as—

- 1 Lieutenant-General (*Feldmarschal-Lieutenant*).
- 9 Major-Generals.
- 22 Colonels.
- 25 Lieutenant-Colonels.
- 29 Majors.
- 118 First Class Captains (including 7 in the Reserve).
- 52 Second Class do.
- 166 First Lieutenants (including 6 in the Reserve).
- 228 Lieutenants (including 107 in the Reserve).
- 5 Cadets, all in the Reserve.

The Captains and Subalterns in the Reserve are all shown as belonging to the Regiments. Though all Officers below the rank of Second Class Captain are

¹ The Pioneers are the pontoneers of the Austro-Hungarian Army.

shown as Regimental Officers, there are, nevertheless, a good many of these not doing duty with the Regiments. For instance, 1 Major is returned as attached to the Railway and Telegraph Regiment, and 11 Captains as belonging to Engineer Directions (i.e., on command with the Engineer Staff), or attached to the General Staff, Training Establishments, &c. There are also some 41 First Lieutenants (chiefly among the seniors) and 2 Second Lieutenants attached to Engineer Directions, 4 First Lieutenants attached to the General Staff, 2 First Lieutenants to Military Training Establishments, 1 First Lieutenant to the Intendanz, and 1 do. to the Technical and Administrative Military Committee. This shows that the actual number of doing-duty Engineer Officers with the Engineer Regiments is some 2 Colonels, 4 Lieutenant-Colonels, 7 Majors, 60 First and Second Class Captains, and 223 First and Second Lieutenants, or 296 of all ranks. The two Regiments on a peace footing require, according to establishment, some 250 Engineer Officers of all ranks, and it would therefore appear that the Regiments are fully officered.

According to the original Regulations of the Engineers, no Officer could be placed on the *Genie Stab* unless he had passed the advanced Engineer Class with distinction, but though these Regulations are nominally still in force, they were practically put aside in this respect by the Regulations of the 5th April, 1880, by which all Engineer Officers may be employed without distinction either on the Engineer Staff or with the Engineer Regiments.

The Officers of the Engineer Regiments and Staff now form one Corps, or constitute what is called in the Austrian Service a *Concretual Stand* for promotion, &c. It is laid down in the Regulations that an Engineer Officer must be equally fitted for duty with the Regiments or the Staff, and that care is to be taken, in selecting Officers for employment, that they are not too exclusively employed in one branch.

Officers of the Engineer Regiments and Engineer Staff wear the same uniform, with the difference that the former wear the schako and the regimental number (1 or 2) on the buttons, whereas the latter wear the cocked hat with black feathers and plain buttons. The tunic or patrol jacket (*Blouse*) is light blue with cherry-red velvet facings, and the trousers blue-grey with cherry-red seams.

Appointment and Promotion.

Appointment to Lieutenant is made as in the Artillery from students of the Technical Military Academy (*Technische-Militär-Akademie*) at Vienna, or from Acting-Officer-Cadets socially and otherwise fit for the rank. In the Engineers the proportion of the latter is very small.

The Technical Military Academy prepares students for commissions in the Artillery, Engineers, and Pioneers, and every annual batch of students is divided into Artillery and Engineer classes. The nominal number of students at the Establishment is 200. The course of study lasts three years. There is also a preparatory school for the Academy—the *Militär-Ober-Real Schule*—at Weisskirchen in Moravia with a nominal establishment of 450 pupils.

Cadets must serve at least one year before being eligible for a commission, and be accepted by the Officers of the Regiment as socially and otherwise fit for the same.

Cadets join the Engineer Regiments from the Engineer Cadet School (*Genie-Cadeten-Schule*) at Vienna, which has an establishment of thirty students.¹

¹ There are 12 Cadet Schools in various parts of the Empire for the Infantry. 1 at Weisskirchen for the Cavalry, 1 at Vienna for the Artillery, 1 at Vienna for the

There are no cadets on the active list of the Engineers at present, and only five in the Reserve, so that appointment to Lieutenant in the Engineers is practically confined to successful students from the Academy.

To complete the higher technical training of Engineer Officers, there is an advanced Engineer class (*Höherer-Genie-Curs*) at Vienna, which, with the advanced Artillery class, is under the Technical Administrative Military Committee. The course last two years. Officers to be admitted to it must have not less than two years' service and be below the rank of Second Class Captain. Captains to qualify for promotion to Field Officer may, however, under certain circumstances, be allowed to attend the course.

The Officers studying in the advanced Engineer class in 1885 are given as 13 Captains (First and Second Class), and 24 First Lieutenants.

Captains need not pass the entrance examination to attend the class. Any Captain may pass the final examination of the course without having attended it, and under certain circumstances, if he fails, may be allowed a second trial.

Promotion from Lieutenant to Captain goes according to the "qualifications lists." Promotion from Second to First Captain goes by seniority.

A Captain must have passed the final examination of the advanced Engineer class to be promoted to Field Officer.

Promotion in the Engineers is guided by the same Regulations as in the other arms, that is to say, by seniority (*tourlich*), provided the Officer qualifies, and by selection (*ausser tourlich*) if the Officer have special qualifications. Below the rank of Field Officer one step in every six may be given by selection, and in the higher ranks one in every four. Engineer Officers to be promoted by selection must have passed the final examination of the advanced class with distinction.

The Inspector-General of Engineers.

(General Genie-Inspector.)

The Engineers are under an Inspector-General of Engineers (*General Genie-Inspector*) at the War Ministry. He is assisted by a Colonel and a Captain of Engineers. His chief duties are to advise the War Minister on all questions connected with the Engineer service, the training of the Engineer troops, and the promotion and transfer of Officers and their distribution in the event of hostilities.

There is a Commanding Engineer (*Genie-Chef*) on the Staff of each Army Corps district and the Zara Command, acting in the capacity of assistant or adviser (*Hilfsorgan*) to the General in command. He has charge of all fortifications and military buildings in the command, as well as the technical and administrative supervision of all military works carried on by the "Engineer Directions" under him. He is assisted by a Field Officer as Executive Officer.

The Technical and Administrative Committee at the War Ministry.

There is a Technical and Administrative Committee (*Technisches und Administratives Comité*) at the War Ministry directly under the War Minister, which is supposed to deal with all questions of a scientific, technical, or administrative nature. It is under the presidency of a Lieutenant-General assisted by six Officers of various ranks of the Artillery, Engineers, Pay Department, &c., and is divided into four Sections. The

Engineers, and 1 at Hainburg for the Pioneers. The Engineer Cadet School is by far the smallest.

first deals with Artillery matters, the second with Engineer matters, the third with Intendence matters, and the fourth with matters of a technological nature. Each Section has its Chief (*Section-Chef*) and is further divided into *Abtheilungen* or departments, each with its *Vorstand* or head. The second Section is divided into three such *Abtheilungen*, and gives employment to 14 Engineer Officers of various ranks and 2 Professors. There are besides 3 Engineer Officers employed on the Staff of the President and in the fourth Section, making 17 employed on the Committee in all.

The training establishments for Officers of the Artillery and Engineers are also under the supervision of the Committee.¹

The Engineer Department at the War Ministry.

The 8th Department (*Abtheilung*) of the War Ministry has the general administrative supervision of the working of the Engineer Directions and establishments, and has administrative charge of the stores and *matériel* belonging to the Engineers, Pioneers, and Railway and Telegraph Regiment.

It is under a Major-General of Engineers, and gives employment to some 9 Engineer Officers of various ranks and 4 *Beamte* (*employés* with relative Officers' rank).

Duties of Officers of the Engineer Staff in Peace.

In the reorganization of the Engineers that took place in 1869, the construction and maintenance of barracks and military buildings was transferred to a special department styled the *Militär-Bau-Verwaltungs-Officiers-Corps*, the *personnel* of which consisted of Engineer Officers, Officers of the other arms, and retired Officers, leaving the construction and maintenance of fortifications alone to the Engineer Staff.

By an order of the 9th July, 1876, however, the first named department was done away with, and its duties again handed over to the Engineer Staff.

There are still, however, 1 Colonel, 1 Lieutenant-Colonel, 2 Majors and 17 First and Second Captains of the *Militär-Bau-Verwaltungs-Officiers-Corps* remaining. They are attached permanently or otherwise to the *Genie Stab*. They wear a uniform like the latter, but the buttons are white instead of yellow.

Engineer Directions.

In the territory comprised in each Army Corps district there are one or more Engineer Directions with offices in the most important military garrisons. They are in each case under the General Commanding the Army Corps of the district as regards military and *personnel* matters, and under the Commanding Engineer (*Genie-Chef*) of the district in technical and administrative business.

Each Direction is under a Director (*Genie-Director*)—a Field Officer or Captain of the Engineer Staff—assisted by a certain number of Officers and *employés* (*Militär-Bau-Rechnungs Beamte*) corresponding to our clerks, surveyors, foremen of works, &c.

When works are undertaken on a large scale it is usual to form a special "Direction" for the purpose.

¹ This Committee was created on the Engineers being reorganized in 1869. Before this, there were two distinct Committees, one for the Artillery and the other for the Engineers, quite independent of each other, dealing with all questions of either arm in technical, scientific, and *personnel* matters.

The present arrangement of the permanent Engineer Directions is as follows:—

Army Corps.	Headquarters.	Engineer Directions.
1st	Cracow.....	Cracow, Przemysl.
2nd	Vienna.....	Vienna, Linz.
3rd	Gratz.....	Gratz, Klagenfurt, Trieste, Pola.
4th	Buda-Pesth.....	Buda-Pesth, Fünfkirchen.
5th	Presburg.....	Presburg, Komorn.
6th	Kaschau.....	Kaschau.
7th	Temesvar.....	Temesvar, Arad.
8th	Prague.....	Prague, Budweis.
9th	Josephstadt.....	Josephstadt, Theresienstadt.
10th	Brünn.....	Brünn, Olmütz.
11th	Lemberg.....	Lemberg, Ozernowitz.
12th	Hermannstadt ..	Hermannstadt, Karlsburg.
13th	Agram.....	Agram, Esseg, Peterwardein.
14th	Innsbruck.....	Innsbruck, Franzensfeste, Trent.
15th	Serajevo.....	Serajevo, Dolnia-Tuzla, Gorazda, Banjaluka, Mostar, Trebinje.
The Military Command of Zara		Ragusa, Cattaro.

The Engineer Staff with the Mobilized Armies in the Field.

There would be on the Headquarter Staff of the Commander-in-Chief of the Armies in the Field (*Armee-Ober-Commando*) a General Officer of Engineers as Commanding Engineer (*Genie-Chef*), and on the Staff of the General Commanding an Army (*Armee-Commando*) a General Officer or Colonel in a similar capacity (*Armee-Genie-Chef*).

On the Staff of the General Commanding an Army Corps (*Corps-Commando*), the Commanding Engineer would be either the Officer Commanding the Battalion of Engineers, the companies of which were attached to the Army Corps, or a Field Officer of the Engineer Staff; the former would be accompanied by his Adjutant, and the latter would be given a subaltern of Engineers as an Adjutant. Under certain circumstances a Captain of the Engineer Staff would be attached to the Staff of a Division as Commanding Engineer, but not as a rule.

The Commanding Engineer in the above cases is, like the Officer commanding the Artillery, what is termed in the Austrian Service a "*Hilfsorgan*" or advising agent of the General in command.

The Commanding Engineer on the Staff of the Commander-in-Chief of the Armies in the Field would be assisted by a Field Officer, an Officer below the rank of Field Officer, and a clerk. The total establishment would be 3 Officers, 10 non-commissioned Officers and men, 2 civilians, 16 horses, and 2 two-horsed wagons.

The Commanding Engineer of an Army would be assisted by a Field Officer, 2 Officers below the rank of Field Officer, and 2 clerks, the total establishment being 4 Officers, 13 non-commissioned officers and men, 1 civilian, 15 horses, and 2 two-horsed wagons.

The Commanding Engineer of an Army Corps would be assisted by an Officer and a clerk, the total establishment being 2 Officers, 6 non-commissioned officers and men, 6 horses, and 1 two-horsed wagon.

Engineer Directions in War.

The Engineer Direction of any fortress of the Empire that might be

threatened by an enemy would be strengthened and attached to the Staff of the fortress in question. It would then form part of the defending garrison.

If necessary certain special Directions would be formed to undertake works of defence (*Befestigungs-Bau-Directionen*).

In the case of siege operations, there would be a Commanding Engineer (*Belagerungs-Genie-Chef*) appointed—a General or Colonel according to the scale of the undertaking. If the greater portion of an Army were to undertake a siege, the Commanding Engineer of that Army would be appointed to the post. There would also be under him one or more Engineer Siege Directions (*Belagerungs-Genie-Directionen*) with the Engineer Siege Park (*Belagerungs-Genie-Park*).

Reference has already been made to the anomaly of the existence of Engineers and Pioneers in the Austrian Army. The latter it should be remembered are the Pontoneers of the Austrian Army. Though the Engineers are supposed to undertake all kinds of bridging either with floating or fixed supports, bridging is looked upon more as a Pioneer than an Engineer service, and it is laid down by Regulation that if detachments or parties of Engineers and Pioneers are employed together at any bridging operation, pontoon or otherwise, the Pioneer Officer takes charge. If, however, the work be fortifying, mining, or demolition, the Engineer Officer takes charge. In all other work which forms part of the training of both Engineers and Pioneers, the Senior Officer present would take charge, unless special instructions to the contrary were given on the subject.

THE ENGINEER REGIMENTS (GENIE TRUPPE).

Peace Organization.

The *Genie Truppe* is organized in two distinct Regiments, numbered 1 and 2, and bearing besides the names of their honorary Colonels (*Regiments-Inhaber*). The 1st Regiment now bears the title of "*Kaiser Franz Joseph*," and the 2nd that of "*Erzherzog Leopold*."

Each Regiment is organized in a Regimental Staff, 5 Field Battalions of 4 Field Companies each, 2 Reserve Companies, and 1 Depôt Battalion of 5 Depôt Companies.

The Field Battalions of each Regiment are numbered 1 to 5, the Field Companies 1 to 20, the Reserve Companies 1 and 2, and the Depôt Companies 1 to 5.

In peace the Depôt Battalions exist in Cadre only, and are stationed with the Regimental Headquarters or Staff; a Depôt Company in Cadre is formed for every detached Field Battalion.

There are also 15 Intrenching Tool Columns and the Chief Engineer Park, belonging to the Engineer Regiments.

The Regimental Staff consists of a Colonel in command, an Adjutant (Lieutenant), a Quartermaster (*Proviant-Offizier*), a Captain or Lieutenant Judge Advocate (*Auditor*) and a Surgeon (*Regiments-Arzt*), besides 1 non-commissioned officer clerk, 5 Officers' servants, and 4 horses.

A Field Battalion Staff consists of a Lieutenant-Colonel or Major in command, an Adjutant (Lieutenant), a Surgeon (except in the 1st Battalion), 3 Officers' servants (except in the 1st Battalion), and 3 horses.

A Field or Reserve Company is commanded by a Captain. In the case of the former there are 4 subalterns, but in the latter only one.

The Peace Establishments of a Field Reserve Company and of the 1st and 2nd Regiments are given in detail in Tables I and II.

The Colonel commands the Regiment in peace in every detail, and his duties and responsibilities are given in the "*Dienst Reglement für das K. K.*"

Heer," and in certain Special Regulations. Certain powers are, however, delegated to Officers commanding detached Battalions, such as disciplinary powers within special limits as laid down by regulation for Officers commanding detached Battalions, the distribution and employment of non-commissioned officers and men actually serving, the granting of leave to Officers and men, the transfer of non-commissioned officers and men (not interfering with promotion), certain judicial investigations, and other minor similar details. In war, Officers commanding Battalions can promote up to the rank of company sergeant-major inclusive, but in peace it remains with the Colonel in command to delegate either entirely or partially this power to the Officer commanding a detached Battalion.

The Officer commanding a Battalion is entrusted with the maintenance of military order, discipline, and the efficiency of all under his command.

He reports to the Colonel commanding the Regiment on all matters affecting the *personnel* of the Officers of his Battalion, their qualifications for promotion, and such like details.

In the case of Companies or Detachments shown as separated from the Battalion in the "*ordre de bataille*," and working under the Commanding Engineers of Army Corps or Engineer Directors, the power to promote up to the rank of company sergeant-major inclusive would rest with these Officers.

The *Dépôt* Battalion Cadres and detached *Dépôt* Company Cadres keep the rolls of their respective establishments, as well as the rolls of the Officers and men not with the colours of the Field Battalions of which they form the *Dépôts*; and in the case of the *Dépôt* Battalions, the rolls of the Reserve Companies as well.

The Officer commanding the *Dépôt* Battalion Cadre is under the Colonel commanding the Regiment, and the Officer commanding a *Dépôt* Company Cadre under the Officer commanding the Battalion to which it belongs.

The Officer commanding the *Dépôt* Battalion Cadre acts as President (*Verwalter*) of the Board on Stores and Equipment (*Material-Verwaltungs-Commission*); the detail as regards books and accounts, and the issue of stores, &c., in case of an augmentation, rests with the subaltern Officers. Officers commanding *Dépôt* Company Cadres of detached Battalions, and their attached subalterns, have similar duties; the latter would also be employed as Battalion Quartermasters (*Proviant-Offiziere*). Officers belonging to *Dépôt* Cadres have to attend instruction and exercises so far as their duties allow them.

The senior Regimental Paymaster (*Truppen-Rechnungsführer*) belonging to *Dépôt* Battalion Cadre is a member of the Regimental Administration Board (*Verwaltungs-Commission*), and the Paymaster of the detached *Dépôt* Company Cadre a member of the Battalion Administration Board.

The Engineer troops are, in purely military matters, under the Officers commanding the units they are shown as belonging to in the "*ordre de bataille*," but in scientific, technical, and administrative matters they are immediately under the Imperial War Ministry.

The independent detached Battalions and Reserve Companies are, except in certain matters reserved for the Colonel commanding the Regiment, under the Army Corps (or *Zara*) Commands through the Divisional and Brigade Commands they happen to belong to. When two Reserve Companies are stationed in the same place, the senior Company Commander would have the same position, in a military sense, as the senior Company Commander of a detached Half-Battalion, and would supervise the training and exercises of the Companies present.

In peace all the fractions of a Regiment, including the two Reserve Companies stationed at the same place as the Regimental Headquarters, form one corps for rations, pay, accounts, &c. (*Wirtschafts- und Verrechnungsg-*

Korper), such matters being managed by the Regimental Administrative and Pay Board (*Verwaltungs- und Cassa-Commission*).

These matters are similarly performed, in the case of independent detached Battalions, by Battalion Administrative and Pay Boards with their respective Depôt Company Cadres. When two or more Battalions of the same Regiment happen to be stationed in the same place, the War Ministry decides whether they are to be treated as a single or separate corps in this respect.

Detached Companies may be treated independently in this respect under certain conditions.

The Statements of Accounts of the Engineer Troops are submitted to the Intendants of the Military Territorial Commands they happen to be in.

The Regimental General Returns and Rolls showing Reserves, &c. (*Haupt-Grundbuch*) are always kept by the Administrative Board which permanently remains with the Regimental Headquarters or, as the case may be, Depôt Battalion Cadre Headquarters.

Quarters in Peace.

The Engineer troops are distributed in peace with a view to facilitate recruiting and mobilization on the one hand, and training and exercises on the other. As a rule the distribution is a permanent one.

Of the five Battalions of each Regiment, two are stationed with the Regimental Headquarters, and the remainder elsewhere.

The following are the garrisons the Engineer troops are quartered in at present :—

1st Regiment :—

Headquarters, Depôt Battalion Cadre, and 3rd and 5th Field Battalions, at Olmütz (X Corps).

1st Field Battalion at Przemyśl (I Corps).

2nd Field Battalion at Cracow (I Corps).

4th Field Battalion at Prague (VIII Corps).

1st and 2nd Reserve Companies at Theresienstadt.

2nd Regiment :—

Headquarters, Depôt Battalion Cadre, and 1st and 3rd Field Battalions at Krems (II Corps).

2nd Field Battalion at Vienna (II Corps).

4th and 5th Field Battalions at Buda-Pesth (IV Corps).

1st and 2nd Reserve Companies at Gratz.

Recruiting.

Recruits are obtained for the Engineer Regiments by selection from the annual contingent, and in the case of drivers, bätmen, &c., by the transfer of men from the Cavalry Reserves.

The Instructions on Recruiting (*Instruktion zur Ausführung der Wehrgesetze*) give the recruiting districts from which the different Battalions obtain their respective batches of recruits.

According to the "Verordnungsblatt," No. 7 of 1883, the 1st Regiment draws its recruits as follows :—

The 1st and 2nd Battalions stationed at Olmütz and Cracow respectively, from Moravia and Silesia. The 3rd Battalion at Olmütz, the 4th Battalion at Prague, and the 5th Battalion at Olmütz, from Bohemia.

The 2nd Regiment draws its recruits—the 1st Battalion at Krems, from Styria, Carinthia, Carniola, Istria, Goritz, Gradiska, and Trieste: the 2nd Battalion at Vienna, and the 3rd Battalion at Krems, from Upper and Lower

Austria and Salzburg; and the 4th and 5th Battalions at Buda-Pesth and Koems respectively, from Hungary.

Thus Austria proper and Salzburg furnish recruits for 2 Battalions; Moravia and Silesia for 2 Battalions; Bohemia for 3 Battalions; Styria, Carinthia, Carniola, the Adriatic Coast, and Dalmatia for 1 Battalion; and Hungary for 2 Battalions.

The following are the rules followed in selecting men for the Engineers:—

The minimum standard is 1·68 metres (5 feet 6 inches), the men must be physically strong and able to read and write, or be otherwise intelligent. Especial care is taken that recruits have good sight and hearing. Recruits of superior education may be taken as short as 1·58 metres (5 feet 2 inches), or even, if they are otherwise very desirable men, at the minimum standard for the Army, viz. 1·554 metres (5 feet 1 inch). Recruits must belong to certain trades in certain proportions. Thus 40 per cent. should be masons, bricklayers, stone-cutters, miners, and smiths; 15 per cent. should be carpenters and joiners; 6 per cent. draughtsmen, fitters, and clerks; and the remainder slaters, gardeners, wheelwrights, packers, basketmakers, turners, ropemakers, painters, and bookbinders, besides shoemakers, tailors, saddlers, harness-makers, and butchers, in sufficient numbers for small complete detachments.

Recruits are called upon to join nominally on the 1st October. The contingent is distributed among the Field and Reserve Companies, keeping in every case as near as possible to the same proportion of the different trades.

In time of peace any diminutions in the strength are to be filled up at once in the case of the *Dépôt* Company Cadres, but in other units twice a year, viz., in the autumn when the recruit contingent joins, and in the spring, nominally on the 1st April.

Men re-engaging from year to year, having served the prescribed time with the colours, from company sergeant-major downwards, must not exceed 250 in number in an Engineer Regiment. The men given in Table V are not, however, reckoned in this.

Drivers and Officers' batmen and grooms are obtained every autumn, when the recruit contingent joins and the reservists granted furlough, by transfers of reserve men from Cavalry Regiments by order of the War Minister.

It is the duty of the Colonel in command to see that the necessary number of reserve men of all ranks is forthcoming in case of mobilization, with a surplus margin of 6 per cent.

The number of recruits annually required by a Regiment is about 830, so that the total number required for the Engineers is 1660.

Arms and Accoutrements.

Non-commissioned officers and men shown on the establishment as belonging to the *Feuergewehr Stand*, or armed with firearms, carry the *Werrd* carbine, known in the Austrian Service as the *Extra-Corps-Gewehr*. It is fitted with the old-fashioned bayonet. Those armed with carbines also carry the Pioneer's short sword, known as the *Pionnier-Säbel*. Acting-Officer Cadets wear the Infantry Officer's sword. Armourers wear the Infantry non-commissioned officer's sword. All other non-commissioned officers and men are armed with the Pioneer's sword. Non-commissioned Officers (*Unter-offiziere*) wear a sword-knot on the hilt of the Pioneer's sword.

Non-commissioned officers armed with the carbine carry 20 rounds in the field, lance-corporals and sappers 30 rounds.

The clothing is of the German¹ Infantry pattern. The tunic, blouse, and

¹ There are two patterns of uniform in the Austro-Hungarian Army, known as the "German" and the "Hungarian."

jacket are light-blue with cherry-red facings, the trousers grey-blue with cherry-red seams. The schako, forage-cap, hood, great coat, boots, belts, knapsack, haversack, water bottle, mess tin, and minor details of the kit are all of the Infantry pattern. The schako and tunic, as in the other dismounted branches of the Austrian Army, are not taken into the field, the field dress being the blouse and forage-cap.

The colour of the Officers' uniform is the same as that of the men, but the facings are of velvet. The Officer's forage cap is of a different pattern.

The buttons are yellow, with the number of the regiment. The belts are black.

The distinguishing marks for rank are the same as in the Infantry.

Training.

The theoretical and practical training of the Engineer Regiments is laid down in Training Regulations of the Austrian Army (*Instruktion für die Truppen-Schulen des K. K. Heeres, IV Theil*) and other Special Instructions. Infantry drill must be finished, in the case of a Company, by the end of June, and in the case of the Battalion, by the end of August. The technical training must also be carried on during the time the recruits get their preliminary military training in the winter months, so that by the end of June the last joined contingent may be available as workmen in field duties. The training in the case of Field and Reserve Companies is the same.

No man can be detached for any duty not regimental, before he has completed a year's service; and with a view to facilitate training, all non-commissioned officers and men on command who could claim their furloughs in September, are recalled in March, unless they are willing to re-engage for another year. In the case of those who have served their full term of three years, this need not be done.

Lance-corporals and sappers who prove themselves very efficient workmen, are given a distinguishing mark (*Arbeits-Auszeichnung*), and keep this on promotion. It is of the same form as the good shooting badge in the Infantry, and consists of a cherry-red worsted cord attached to the button of the coat, something like an aiguillette.

Non-commissioned officers and men in the Reserve of the 2nd, 4th, and 6th years' Reserve service are annually called up for training in the spring or autumn. The dates of calling out are fixed every year by the War Ministry with due regard to the harvest, &c. The periods are always well within the limits given by Article 36 of the *Wehrgesetz*. Reserve men called out for training are attached to Reserve Companies, or to Field Companies if these are in districts which furnish recruits for the Engineers.

Reserve Officers appointed from one-year volunteers are called out three times during their service in the Reserve. Reserve Officers who have been Officers proper (*Berufs-Offiziere*) are called out with their respective Reserve Contingents, but never for more than four weeks at a time. As a rule they would do duty with Field Companies at manœuvres.

The establishment (*Grundbuchstand*) of all the fractions of the Regiment are readjusted annually at the time the Reservists are furloughed, with a view to minimizing transfers and changes in the event of mobilization. In doing this the following are the main principles observed:—

The establishment of a Field or Reserve Company must show an excess in men, above its total war establishment, equal to its normal annual recruit contingent. This excess enables in the first place the Battalion Staffs to be completed and other casualties replaced on mobilization, but it is chiefly intended to enable the Field Companies to leave insufficiently trained

men behind, and yet take the field with a full war strength. The men left behind would be transferred to the *Depôt* Companies. The establishment of these comprises all the fractions and detachments given in Table V, with the exception of Intrenching Tool Column No. 3, the non-commissioned officers and men of which are borne on the strength of the 1st Reserve Company of the 2nd Regiment.

The establishment of the *Depôt* Companies should show the number of non-commissioned officers and bandsmen required for the maximum strength of the *Depôt* Companies, as given in Note c to Table III, and for the detachments, &c., given in Table V, with an excess of 6 per cent.

From the surplus non-commissioned officers and men of the Engineer Regiments, a certain number are annually transferred, by order of the War Ministry, to the establishment of the Railway and Telegraph Regiment, for service in the Field-Telegraph Detachments.

WAR ORGANIZATION.

Mobilization.

The first act is the calling out of all Officers and men in the Reserve. The Battalions are then raised to a war footing, and the *Depôt* Battalions formed, together with such Staffs, Detachments, &c., as do not exist in peace.

Each Regiment would mobilize—

1. A Regimental Staff.
2. 5 Battalion Staffs.
3. 20 Field Companies.
4. 2 Reserve Companies.

Consequently there would be 40 Field and 4 Reserve Companies.

On the Regiment being mobilized for war, the Colonel receives an appointment from the War Ministry to another post, but he nevertheless retains the management of certain matters connected with the *personnel* of the Officers of the Regiment, unless prevented from doing so by his new office, in which case he would hand the business over to the Officer commanding the *Depôt* Battalion.

Each Regiment would form, on mobilization, with the Cadres existing in peace, a *Depôt* Battalion consisting of a Staff and 5 Companies, that is to say, a Company for each mobilized Battalion. There would be consequently 10 *Depôt* Companies in all. These would remain in war in the places where their respective Battalions were quartered in peace.

In extreme cases 4 out of the 5 *Depôt* Companies of each Regiment might be mobilized, leaving detachments to form *depôts*. The 1st Company would, however, always remain at the Regimental Headquarters.

A *Depôt* Company would have much the same strength as a Field or Reserve Company, but unless mobilized would have no transport or horses.

On mobilization the Field Officer next senior to the Colonel takes command of the *Depôt* Battalion, and the Captains belonging to the *Depôts* in peace would not be changed, unless for very urgent reasons. The *Depôt* Battalions and Companies take over from the mobilized Battalions and Companies the men of the last recruit contingent whose training may be incomplete, and it is then their business to continue their training, and be prepared to replace losses and casualties in the field.

As soon as the mobilized Field Battalions leave their peace garrisons and are detached from Regimental Headquarters, their respective *Depôt* Companies are, in an administrative point of view, under the Officer commanding the *Depôt* Battalion. The latter, on the departure of the Colonel, takes over the administrative management of the Regiment, and in some cases the *personnel*

matters of the Officers as well. The Regimental Adjutant becomes the Adjutant of the *Depôt Battalion*.

The Administrative Board (*Verwaltungs-Commission*) of the Regiment becomes, on mobilization, the Administrative Board of the *Depôt Battalion* (*Verwaltungs-Commission des Ersatz Bataillons*). The Administrative Boards of the Battalions not quartered with the Regimental Headquarters in peace, are broken up on mobilization, and the *Depôt Companies* of these Battalions are attached, for financial and administrative matters, to some *Verwaltungs-Commission* in the place they are stationed in.

A mobilized Battalion, when kept together, forms one corps for Pay and Accounts; but detached Companies are for such matters either attached to the Paymaster (*Truppen-Rechnungs-Führer*) of a Brigade or Divisional Staff, or the Paymaster of some Corps or Regiment.

A mobilized Battalion Staff includes the Lieutenant-Colonel or Major commanding the Battalion, but varies in total strength. A complete Staff would consist of 5 Officers, 3 non-commissioned officers, 12 drivers, servants, &c., and 11 horses. (See Tables IV and IV.)

A mobilized Field or Reserve Company would consist of 5 Officers (1 Captain and 4 subalterns), an Acting-Officer-Cadet, 28 *Unterofficiere* and Corporals, 206 lance-corporals, sappers, and drivers, 28 horses (2 riding and 26 draught), and 6 four-horsed wagons (1 *Rüstwagen* or wagon for rations, forage, and general stores, and 5 tool and implement wagons).

The details of the Regiments when mobilized are given in Tables III, IV, and IV.

The total strength varies slightly, but would be about 167 Officers and 6,180 non-commissioned officers and men, taking the *Depôt Companies* as about the same strength as the Field or Reserve Companies.

Each Regiment taking annually a contingent of 830 men, and being able to fall back, on mobilization, on 10 classes¹ (3 with the colours and 7 in the Reserve), would, allowing for casualties, have at its disposal some 6,680 men,² with a surplus consequently of some 500 men.

There are no Landwehr Cadres for the Engineers. Reserve men passing into the Landwehr would be detailed for service in fortresses, &c., and Engineer Landwehr detachments might of course be formed in war for home defence.

As a general rule a Company of Engineers would be given to every mobilized Infantry Division, but this is not laid down as a hard and fast rule, and more than one Company might be attached, according to circumstances, should it appear desirable. Similarly a Company with mountain equipment would be attached to a Mountain Infantry Division, and a Section similarly equipped to an independent Mountain Brigade.

Of the 15 Army Corps already referred to as existing in peace, the first 13 would, when mobilized for the field, probably comprise each two complete Infantry Divisions of the active Army and a Landwehr (cis-Leithian) or Honved (trans-Leithian) Division. The 14th Army Corps, organized for the defence of the Tyrol and equipped for mountain warfare, would comprise a Division of the active Army and a Tyrolese Reserve Division (*Landesschützen*). The 15th Army Corps and the troops of the Zara Command could not be reckoned on for the Armies in the field, being required for the defence of Bosnia, Herzegovina, and Dalmatia.

According to all probability the number of Divisions mobilized for the field would be 41, and there being 44 Field and Reserve Companies of Engineers,

¹ The service in the Austro-Hungarian Army is 3 years with the Colours, 7 in the Reserve, and 2 in the Landwehr.

² Taken from Tables giving the strength of the Austro-Hungarian Army calculated by the Italian General Staff.

there would only be 3 left for local defence, unless we add the 8 *Depôt* Companies that could be mobilized, when there would be 11 at the very utmost, and this appears little enough.¹

FIELD EQUIPMENT.

The stores of every kind required for a war footing of those fractions of an Engineer Regiment that would be mobilized at the Regimental Headquarters, are all kept ready there. The stores required for the detached Battalions and detached Reserve Companies are kept where these units would be mobilized, that is to say, at their peace quarters.

The stores are in charge of the *Verwaltungs-Commission* of the Regiment or Battalion, as the case may be. The stores for the Reserve Companies are in charge of the Regimental *Verwaltungs Commission*.

The various duties connected with the charge and care of the stores required for mobilization, as well as the stores required for training in peacetime, are entrusted to the *Material-Verwaltungs-Commission* of Regiments or Battalions. The Reserve Companies belong to the Regiment in this respect.

The Field Equipment is classed under the following headings:—

- A. The Field Equipment of the Field and Reserve Companies.
- B. " " " " Battalion Staffs and Commanding Engineers of Army Corps.
- C. The Reserve Field Equipment of the Army in the Field, comprising—
 - a. The Intrenching Tool Columns (*Schanzzeug-Kolonnen*).
 - b. The Artillery Reserve Stores, as regards powder and explosives.
 - c. The Engineer Siege Parks (*Belagerungs-Genie-Parks*).
- D. The Reserve Equipment in permanent depôts, comprising—
 - a. The Chief Engineer Park (*Haupt-Genie-Park*) at Vienna.
 - b. The Engineer Parks for defensive purposes in fortresses (*Vertheidigungs-Genie-Parks*).
 - c. The Intrenching Tool Depôts (*Schanzzeug-Depôts*).
 - d. The stores used for training purposes of the Engineer Regiments.
 - e. The Instrument *Depôt* belonging to the Technical and Administrative Committee.

A. The Field Equipment of the Field and Reserve Companies.

The Field Equipment of a Field or Reserve Company is so arranged that each Section can work independently. The stores comprised in the equipment of a Section can be carried on the four-horsed Section Equipment wagon (*Genie-Zugs-Requisiten-Wagen*). Besides these there is also with every Company a reserve set of field equipment stores, for replenishing the Section Equipments, carried on a four-horsed Company Equipment wagon (*Genie-Campagnie-Requisiten-Wagen*).

The Section Equipment comprises—

1. The Portable Equipment.
2. The Reserve and Mining Equipment.
3. Explosives, fuzes, &c.

The Portable Equipment of a Section is calculated to enable 54 men to be

¹ Until recently there were 40 Field and 16 Reserve Companies available; but on the formation of the Railway and Telegraph Regiment, the latter were reduced to four.

employed at earth works, and 32 men at ordinary timber work, without using the Pioneer sword.

In the field the Portable Equipment would be carried on the march by the men, and the knapsacks carried in the Section Equipment wagon, unless it were certain that no work would have to be undertaken. In peace the Portable Equipment is only carried occasionally for practice at manœuvres, &c.

The Reserve and Mining Equipment, as well as the explosives, &c., are always carried on the march in the Section Equipment wagon.

The Portable Equipment of a section consists of—

- 18 pickaxes,
- 36 shovels,
- 18 felling axes,
- 2 common axes,
- 4 hatchets,
- 2 chain saws,
- 2 hand (frame) saws,
- 2 saw files,
- 1 saw set,
- 4 chisels,
- 5 augers of various sizes,
- 248 nails of various sizes,
- 1 pincers,
- 8 dogs,
- 1 whetstone,
- 6 measuring rules,
- 1 measuring tape,
- 4 carpenters' pencils,
- 2 tracing ropes,
- 18 sets of lashings.

The Mountain Equipment differs only in there being 25 picks and 25 shovels.

The picks, shovels, axes, hatchets, &c., are fitted with straps (*Schanzzeug-Traggurten*), and the axes and hatchets with leather cases as well. The smaller tools, &c., are carried in 6 leather cases (*Werkzeug-Taschen*).

The Section Equipment would comprise, among other stores—

- 16 charges in tin cylinders,
- 22 large cartridges,
- 42 small do.

In all 41·22 kilos. of dynamite and 31·5 kilos. of cannon powder.

The Mountain Equipment would differ in there being—

- 4 charges in tin cylinders,
- 25·22 kilog. of dynamite,

and no powder.

The charges in tin cylinders are of 2 kilog., the large cartridges of 0·19 kilog., and the small cartridge of 0·12 kilog. of dynamite.¹

The total quantity of explosives with a Field Company is 164·88 kilog. of dynamite and 126 kilog. of powder. In the case of the Mountain Equipment it would be 100·88 kilog. of dynamite only.

The Reserve and Mining Equipment consists of a set of carpenter's tools, a set of quarryman's tools, a set of miner's tools, some minor small stores, and a copy of the Equipment Regulations.

The explosives, fuzes, &c., comprise dynamite cartridges of various sizes,

¹ There are also cartridges of 1·12 kilog. of dynamite for Cavalry Pioneers.

fuzes, detonators, quickmatch, and various other small stores used for demolitions.

The *Company Equipment* consists of—

1. An electrical firing apparatus with complete sets of appliances for firing mines, including 700 metres of insulated, and 2,100 metres of plain, copper wire.
2. A field forge complete with hearth, anvil, bellows, &c.
3. A complete set of smith's tools and appliances.
4. A complete set of shoeing smith's tools and appliances, including 16 horse-shoes and 200 nails.
5. Reserve stores of iron, coal, &c.
6. A set of miner's tools and appliances, including 100 metres of insulated wire and 40 electric fuzes.
7. A levelling instrument.
8. A set of surveying instruments with drawing and sketching materials.
9. A set of signalling flags and lanterns, hand books, a company cash box, &c.

B. The Field Equipment of a Battalion Staff and an Army Corps Commanding Engineer.

This comprises surveying, drawing, and office instruments and appliances for making surveys and projects in the field, and in the case of the Battalion Staff, a battalion cash box, and in the case of an Army Corps Commanding Engineer, the Field Records as well. In either case the equipment is carried in a two-horse covered wagon (*Deckel-Wagen*).

C. The Reserve Field Equipment of the Army in the Field.

a. There would be fifteen *Intranching Tool Columns* belonging to the 1st Line of the Army in the Field. *Intranching Tool Columns* attached to an Army Corps would, for the time being, belong to the 1st Section of the Train Squadron of that Army Corps, and would be under the Officer Commanding it in matters of discipline and rations for man and horse. In technical matters the Columns would be under the Army Corps Commanding Engineers. *Intranching Tool Columns* belonging to an Army, and united in one command, would form the *Intranching Tool Park* (*Schanzzeug-Park*) of that Army, and would generally be placed under an Engineer Officer selected for the purpose. It would march with the Army Ammunition Parks.

Intranching Tool Columns would be used for throwing up field works on a large scale in the field, commencing early siege operations against a fortress, or replenishing the stores with the troops, rendered unserviceable or lost.

The stores of an *Intranching Tool Column* are classed as—

1. Tools and appliances.
2. Explosives, fuzes, &c.
3. Surveying and drawing instruments, &c.

All these stores are carried on 7 four-horsed covered wagons. The tools and appliances are calculated for 1,150 men at earth work, 170 men at timber work, 5 parties of quarrymen, and 4 parties of miners.

The stores of the *Intranching Tool Columns*, including the Train stores, are in charge of the Engineers.

Each *Intranching Tool Column* would consist of 1 sergeant-major, 1 corporal, 6 lance-corporals and sappers (including 1 smith), 14 drivers, 28 draught horses, and 7 four-horse wagons (*Deckel-Wagen*).

The 1st Regiment of Engineers would form 5 Columns and 1 Army Park Staff; the 2nd Regiment would form 10 Columns and 2 Army Park Staffs.

b. *The Artillery Reserve Stores* would supply the Engineers and Pioneers, the Railway and Telegraph Regiment, the Intrenching Tool Columns, and the Cavalry Pioneers, with explosives, fuzes, &c., carried in special two-horsed wagons (*Sprengmittel-Wagen*).

There would be one of these to every Army Corps Ammunition Park in the Artillery Reserve Stores of the 1st Line, and one to every Army Ammunition Park in the Artillery Reserve Stores of the 2nd Line, and there would be 10 such wagons with the Army Ammunition Reserve Parks and Army Ammunition Field Depôts respectively.

These wagons are always in charge of a trained non-commissioned officer of Engineers.

The explosives comprise powder in bags and dynamite in cartridges.

c. There are two *Engineer Siege Parks* that would be mobilized in war. In peace they form part of the Engineer Chief Park and would be mobilized and equipped by it. An Engineer Siege Park in war would be under a Captain of Engineers with a detachment of non-commissioned officer and men of Engineers. The size of an Engineer Siege Park would vary according to circumstances, and no fixed establishment is laid down.

D. Reserve Equipment in Permanent Depôts.

a. *The Chief Engineer Park at Vienna* is the main depôt from which all Engineer Stores, either for attack or defence, would be forthcoming in case of war. It comprises the two Siege Parks just referred to and a reserve of every kind of Engineer matériel. It belongs to the 2nd Regiment of Engineers, and supplies the fractions of this Regiment in peace with certain stores for training and other purposes. It also supplies stores to the Engineer Parks for defensive purposes in Fortresses and the Intrenching Tool Depôts. It is under a Captain on the retired list (*Ruhestand*) who is also a member of the *Material-Verwaltungs-Commission* by which the business of the Park is managed. He is assisted by a subaltern Officer and fourteen men of the 2nd Regiment of Engineers.

b. *The Engineer Parks for defensive purposes in Fortresses* comprise a certain amount of stores and matériel that would be necessary in case of a siege. The Engineers that are quartered in these fortresses draw the stores they require for training purposes from these Parks.

c. There are four *Intrenching Tool Depôts* at Krakau, Brod, Ragusa, and Enns, where a certain amount of Engineer stores are kept in case of war. The stores are chiefly obtained from the Chief Park at Vienna.

d. *The Stores used for training purposes of the Engineer Regiments* would, when the various detachments of these Regiments took the field with their field equipment, be handed over to the Chief Engineer Park or Engineer Parks for defensive purposes in Fortresses, except such stores as were necessary for the training of the Depôt Companies.

e. *The Instrument Depôt*, comprising surveying instruments, electrical firing apparatus, &c., is in charge of the Technical and Administrative Military Committee by which the various branches of the Engineer Service would be supplied with articles of the kind.

Rations and Forage.

The regulations as regards rations in the field are the same for the Engineers as for the other dismounted branches.

As a rule the soldier carries 2 days' ordinary rations (*Currenter-Verpflegs-Vorrath*) in the field with the exception of fresh meat, but under certain

circumstances, 3 or even 4 days' rations. The dismounted Officers' rations are carried by their servants.

The ordinary rations for 2 days consist of: two rations of bread or biscuit, vegetables, preserved soup, salt, pepper, coffee or tea, rum, and tobacco.

One day's fresh meat is carried in the meat wagons.

Corps, Regiments, and Army Corps and Divisional Staffs have their own butcheries, and detachments that have not would draw their meat from these, and only under exceptional circumstances form a Slaughter Depôt (*Schlacht-Vieh-Depôt*). An Engineer Battalion on a full war strength united would be allowed seven live oxen for 4 days' consumption.

Two days' forage (oats and hay), and under exceptional circumstances, even 3 or 4 days' forage, is carried in the wagons.

One day's reserve rations (*Reserve-Verpflegs-Vorrath*) is, besides the above, carried by the dismounted soldier in the pack. It consists of one ration of biscuit (500 grammes), one of preserved meat, one of preserved soup, two rations of salt, and one ration of tobacco. One-third of a hay ration is also carried for each horse.

Train.

The wagons, horses, drivers, &c., of the various Engineer formations in the field are given in the Tables.

There are two kinds of wagons used, viz., the *Deckel-Wagen* of the 1867-80 pattern used for carrying Engineer tools and stores, and the *Rüst-Wagen* or *Proviant-Wagen* used for carrying rations, forage, &c.

The former is a covered wagon, and the latter a wagon with open rail sides (*Leiter-Wagen*).

It has already been seen that a Field Company has 5 four-horsed wagons (*Deckel-Wagen*) for tools and appliances, and 1 four-horsed wagon (*Leiter-Wagen*) for forage, provisions, &c.

A Battalion Staff has a two-horsed *Deckel-Wagen*, but if a Battalion or a Half Battalion were kept together, it would have in addition a two-horsed meat wagon, and in the former case a two-horsed canteen wagon (*Markender-Wagen*) as well.

In the mountain equipment, pack animals would be used either instead of, or with wheeled transport.

Deckel-Wagen for the commanding Engineers of 3 Army Corps are in charge of the 1st Regiment, one being with the Depôt Battalion Cadre 10th Army Corps), one with the 2nd Depôt Company Cadre (11th Army Corps), and one with the 4th Depôt Company Cadre (9th Army Corps).

Deckel-Wagen for 8 Commanding Engineers of Army Corps are in charge of the 2nd Regiment, 2 being with the 2nd Depôt Company Cadre (5th and 14th Army Corps), 5 with the 4th Depôt Company Cadre (6th, 7th, 12th, 13th, and 15th Army Corps), and one with the 1st Reserve Company at Gratz (3rd Army Corps).

TABLE I.—*Peace Strength of a Field and a Reserve Company.*

		A Field Company.	A Reserve Company.	
Officers	{ Captains	1	1	
	{ Subalterns	4	1	
Non-commissioned officers and men	{ with carbines	Sergeant-major	2	1
		Sergeant (<i>Zugsführer</i>)	4	2
		Corporals	8	3
		Lance-corporals	8	3
		1st class sappers	34	20
	{ without carbines	2nd „ „	48	28
		Non-com. officer paymaster	1	1
		Bugler (1st class sapper)	1	—
		Officers' servants	5	2
Total		116	62	

Remarks.—(A) Should the company be short of a subaltern Officer, there would be an additional sergeant-major and one Officer's servant less.

(B) In a Reserve Company, a sapper would act as bugler.

TABLE III.—*War Establishment of a Field (or Reserve) and Depot Company and Intrenching Tool Column.*

		Field or Reserve Company.	Depôt Company.	Intrenching Tool Column.
Officers	{ Captains	1	1	—
	{ Subalterns	4	4	—
Non-commissioned officers and men.	{ with carbines	Sergeant-majors	3	3
		Sergeants	8	8
		Corporals	16	16
		Lance-corporals	24	24
		1st and 2nd class sappers	160	170
	{ without carbines	Cadet Acting-Officer	1	1
		Non-com. officer paymaster ..	1	1
		Buglers	2	2
		Drivers	15	..
		Officers' servants	5	5
	Total		240	235
				22

Horses.

Draught	{ For a company tool, &c., wagon	4	—	—
	{ For 4 section ditto	16	—	—
	{ For a provision, &c., wagon	4	—	—
	{ For 7 tool, &c., wagons .....	..	..	28
	{ Spare horses	2	—	—
Riding....	For reconnoitring purposes	2	—	—
Total		28	—	28

NOTES.

a. Should there be an Officer or a Cadet-Acting-Officer short, there would be an additional sergeant-major.

b. In a Field or a Reserve Company, a sergeant would be told off as baggage master (*Wagen-Meister*).

c. In war 2nd class sappers can be promoted to 1st class to the extent of two-thirds of the total establishment. The number in a Depot Company may vary, but there should be at least 20 1st class sappers. The total number in a Depot Company may, under certain circumstances, be raised to 300; but when the number exceeds 170, there would be added, for every additional 15 men, a corporal and a lance-corporal, for every additional 30 men a sergeant, and if the excess is more than 100, a Lieutenant, a sergeant-major, and an Officer's servant.

d. In a detached Depot Company there would be a Surgeon or Assistant-Surgeon in addition, with a staff clerk and an Officer's servant.

e. There should be a shoeing smith in the establishment of an Intrenching Tool Column.

TABLE V.—*Showing Non-commissioned Officers and Men on Command in Various Employments.*

	With carbines.		Without carbines.		Total.
	Sergeant-majors, or sergeants, or corporals.	Lance-corporals or sappers.	Sergeant-majors, or sergeants, or corporals.	Lance-corporals or sappers.	
From the 1st Regiment of Engineers.					
The War Ministry .....	..	..	2	..	2
The Office of the Inspector-General.....	..	..	2	2	4
The Engineer Direction at Trieste	1	2	..	..	3
" " Pola	2	18	..	..	20
" " Prague	1	2	..	..	3
" " Budweis	1	2	..	..	3
" " Josephstadt...	1	6	..	..	7
" " Theresienstadt	1	4	..	..	5
" " Brünn	1	2	..	..	3
" " Olmütz.....	1	4	..	..	5
" " Lemberg.....	1	2	..	..	3
" " Czernowitz ..	1	2	..	..	3
" " Cracow.....	1	4	..	..	5
" " Przemysl	1	6	..	..	7
" " Zara	1	2	..	..	3
" " Ragusa	1	6	..	..	7
" " Cattaro.....	1	14	..	..	15
The Artillery Store Depot at Wiener Neustadt.....	..	..	1	..	1
Total	16	76	5	2	99

	Colonel Commanding the Regt. Lieutenant-Colonels or Majors commanding Battalions.		Subaltern Officers.			Captain or Lieutenant-Colonel Judge-Advocates.	Surgeons.
	Regimental Adjutants.	Battalion Adjutants.	Quartermasters.				
Regimental Staff	1	..	1	..	1	1	1
1st Field Battalion	1	..	1	..	..	..
2nd " "	1	..	1	..	..	1
3rd " "	1	..	1	..	..	1
4th " "	1	..	1	..	..	1
5th " "	1	..	1	..	..	1
2 Reserve Companies
Depôt Battalion Cadre.—Staff and 1st and 3rd Depôt Company
Cadres of the— 2nd Depôt Company..
4th " "
5th " "
On command as shown in Table V.
Total	1	5	1	5	1	1	5

- (a.) Of the Captains, two-thirds would be
(b.) Forty-seven of the subalterns would be
(c.) Half the non-commissioned officer pay
(d.) The Peace Establishment of the 2nd F

TABLE II.—*Peace Establishment of the 1st Regiment of Engineers.*

Staff.														Companies.																			
Quartermasters.		Captain or Lieutenant-Colonel Judge-Advocates.		Surgeons.		Paymasters.		Captain or First Lieutenant.		Second Lieutenant.		Corporal clerks.		Armourers.		Non-commissioned officer paymasters.		Staff-sergeants.		Officers' servants.		Horses.		Total.		Officers.		With carbines.					
1	1	1	1	5	1	3	5	6	4
..	2	1	2	2	2	3	4	16	8	16	32	32	136	192	
														416																			
..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	1	2	3	3	3	4	16	8	16	32	32	136	192
														416																			
..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	1	2	3	3	3	4	16	8	16	32	32	136	192
														416																			
..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	1	2	3	3	3	4	16	8	16	32	32	136	192
														416																			
..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	1	2	3	3	3	4	16	8	16	32	32	136	192
														416																			
..	2	2	2	4	6	6	40	56		
														114																			
..	1	1	2	1	1	..	2	..	..	2	6	..	1	1	..	..	..	..	2	6	..	1	1	..	..	..	..	4	4		
														8																			
..	1	..	1	1	..	1	1	..	..	1	4	..	1	1	..	..	..	..	1	4	..	1	1	..	..	..	..	2	2		
														4																			
..	1	..	1	1	..	1	1	..	..	1	4	..	1	1	..	..	..	..	1	4	..	1	1	..	..	..	..	2	2		
														4																			
..	1	..	1	1	..	1	1	..	..	1	4	..	1	1	..	..	..	..	1	4	..	1	1	..	..	..	..	2	2		
														4																			
..		
														16														76					
														92																			
1	1	5	4	1	5	4	1	4	24	6	13	24	38	19	26	86	2,306																

NOTE.

birds would be First Class Captains and one-third Second Class Captains.

alters would be First Lieutenants, and forty-six Second Lieutenants.

ned officer paymasters would be of the rank of sergeant-major, and the remainder of the rank of sergeant (1st and 2nd).

st of the 2nd Regiment differs only from the above in having ninety-eight non-commissioned officers and men on comm

Establishment of the 1st Regiment of Engineers.

Companies.																			
Horses.		Total.		Officers.		With carbines.						Without carbines.							
Officers' servants.	Public property.	Private property.	Officers.	Non-commissioned officers and men.	Horses.	Captains.	Subalterns.	Sergeant-majors.	Sergeants.	Corporals.	Lance-corporals.	1st class sappers.	2nd class sappers.	Non-commissioned officer paymasters.	Sergeant-majors, sergeants, and corporals.	Lance-corporals, 1st and 2nd class sappers.	Buglers.	Officers' servants.	
5	1	3	5	6	4	..	..	..	..	..	..	..	..	..	..	..	..	..
2	1	2	2	2	3	4	16	8	16	32	32	136	192	4	..	..	4	20
								416						28					
3	1	2	3	3	3	4	16	8	16	32	32	136	192	4	..	..	4	20
								416						28					
3	1	2	3	3	3	4	16	8	16	32	32	136	192	4	..	..	4	20
								416						28					
3	1	2	3	3	3	4	16	8	16	32	32	136	192	4	..	..	4	20
								416						28					
3	1	2	3	3	3	4	16	8	16	32	32	136	192	4	..	..	4	20
								416						28					
3	1	2	3	3	3	4	16	8	16	32	32	136	192	4	..	..	4	20
								416						28					
..	..	..	..	..	..	2	2	2	4	6	6	40	56	2	..	..	..	4
								114						6					
2	..	..	2	6	..	1	1	..	..	..	..	4	4	2	..	..	..	2
								8						4					
1	..	..	1	4	..	1	1	..	..	..	..	2	2	1	..	..	..	2
								4						3					
1	..	..	1	4	..	1	1	..	..	..	..	2	2	1	..	..	..	2
								4						3					
1	..	..	1	4	..	1	1	..	..	..	..	2	2	1	..	..	..	2
								4						3					
..	..	..	..	..	..	..	..	16		76				..	5	2	..	..
								92						7					
24	6	13	24	38	19	26	86	2,306						166					
														112					

NOTE.

Third Second Class Captains.
Six Second Lieutenants.
of sergeant-major, and the remainder of the rank of sergeant (1st and 2nd class non-commissioned officers above in having ninety-eight non-commissioned officers and men on command, as shown in Table V, inst

Bridges.		Total.			Grand total.			Total combatants.	
Bridges.	Officers' servants.	Officers.	Non-commissioned officers and men.	Horses (private property).	Officers.	Non-commissioned officers and men.	Horses.	Officers.	Non-commissioned officers and men.
..	..	..	..	..	5	6	4	2	—
4	20	20	444	2	22	446	5	22	420
4	20	20	444	2	23	447	5	22	420
4	20	20	444	2	23	447	5	22	420
4	20	20	444	2	23	447	5	22	420
4	20	20	444	2	23	447	5	22	420
..	4	4	120	..	4	120	..	4	114
..	2	2	12	..	4	18	..	2	8
..	2	2	7	..	3	11	..	2	4
..	2	2	7	..	3	11	..	2	
..	2	2	7	..	3	11	..	2	4
..	..	..	99	..	..	99	—	—	—
		112	2,472	10	136	2,510	29	124	2,230

uncommissioned officer paymasters).
in Table V, instead of ninety-nine.

TABLE VI.—*War Establishment of Detachments furnished*

	Officers.		Non-commissioned.				
	Captains.	Subalterns.	Sergeant-majors.	Sergeants.	Corporals.	Lance-corporals and sappers.	Pay-sergeants.
1st Regiment.							
5 Intrenching Tool Columns .....	..	..	5	..	5	30	..
1 Army Intrenching Tool Park Staff.....	1	..	..	..	..	..	1
On command, as shown in Table V .....	..	..	16			76	..
For 3 Commanding Engineers of Army Corps as Adjutants	..	3	..	..	..	..	..
For the wagons carrying explosives with the Artillery Reserve Establishments .....	..	..	..	..	4	..	..
	..	..	..	..	2	..	..
	..	..	..	..	1	..	..
In various other capacities .....	..	..	100			100	..
Total	1	3	133			206	1
2nd Regiment.							
10 Intrenching Tool Columns .....	..	..	10	..	10	60	..
2 Army Intrenching Tool Park Staffs.....	2	..	..	..	..	..	2
On command as shown in Table V .....	..	..	22			74	..
For 8 Commanding Engineers of Army Corps as Adjutants.	..	8	..	..	..	..	..
For the wagons carrying explosives with the Artillery Reserve Establishments .....	..	..	2	..	28	..	..
	..	..	..	..	3	..	..
	..	..	..	..	5	..	..
	..	..	..	..	4	..	..
For the Engineer Chief Park.....	..	1	3			10	..
In various other capacities .....	..	..	100			100	..
Total	2	9	187			244	2

NOTE.—Intrenching Tool Columns Nos. 2, 5, and 14 are formed by the 2nd Depot

" " " 4, 6, 7, 12, 13, and 15 " 4th "

" " " 3 by the 1st Reserve Company.....

" " " 10 by the Depot Battalion Cadre.....

" " " 1 and 11 by the 2nd Depot Company Ca

" " " 8 and 9 by the 4th " "

The Army Intrenching Tool Park Staffs would be formed at Vienna, Pr

Attachments furnished by the Engineer Regiment.

Non-commissioned officers and men.									Horses.		Total.			Covered wagons.	
Corporals.	Lance-corporals and sappers.	Pay-sergeants.	Sergeant-majors.	Sergeants.	Corporals.	Lance-corporals and sappers.	Drivers.	Officers' servants.	Riding, public property.	Draught.	Officers.	Non-commissioned officers and men.	Horses.	Two-horsed.	Four-horsed.
5	30	..	..	..	..	..	70	..	..	140	..	110	140	..	35
..	..	1	..	..	..	..	..	1	1	..	1	2	1	—	—
..	76	..	..	5	..	2	..	..	..	..	..	99	—	—	—
..	..	..	..	..	..	..	3	3	3	6	3	6	9	3	—
4	..	..	..	..	..	..	..	..	..	..	..	4	—	—	—
2	..	..	..	..	..	..	..	..	..	..	..	2	—	—	—
1	..	..	..	..	..	..	..	..	..	..	..	1	—	—	—
..	100	..	..	..	..	..	..	..	..	..	..	200	—	—	—
..	206	1	..	5	..	2	73	4	4	146	4	424	150	3	35
10	60	..	..	..	..	..	140	..	..	280	..	220	280	..	70
..	..	2	..	..	..	..	..	2	2	..	2	4	2	—	—
..	74	..	2	..	..	..	..	..	..	..	..	98	—	—	—
..	..	..	..	..	..	..	8	8	8	16	8	16	24	8	—
28	..	..	..	..	..	..	..	..	..	..	..	30	—	—	—
3	..	..	..	..	..	..	..	..	..	..	..	3	—	—	—
5	..	..	..	..	..	..	..	..	..	..	..	5	—	—	—
4	..	..	..	..	..	..	..	..	..	..	..	4	—	—	—
..	10	..	..	..	..	..	..	..	..	..	1	14	—	—	—
..	100	..	..	..	..	..	..	1	..	..	..	200	—	—	—
..	244	2	..	2	..	..	148	11	10	296	11	594	306	8	70

by the 2nd Depôt Company Cadre }
 " 4th " " " of the 1st Regiment.
 Company..... }
 in Cadre } of the 2nd Regiment.
 Depôt Company Cadre }
 " " " " }
 at Vienna, Prague, and Buda-Pesth.

TABLE VII.—*Train of*

		Drivers.	Detel.	Wagons.
			Two-	
1st Regiment.	Regimental Staff	2	..	..
	5 Field Battalions { 5 Battalion Staffs	10	5	..
	{ 20 Field Companies	300	..	..
	2 Reserve Companies	30	..	..
	The Dépôt Battalion Staff	1	..	..
	According to Table V	73	3	33
	Total	416	43	
2nd Regiment.	Regimental Staff	2	..	..
	5 Field Battalions { 5 Battalion Staffs	10	5	..
	{ 20 Field Companies	300	..	..
	2 Reserve Companies	30	..	..
	The Dépôt Battalion Staff	1	..	..
	According to Table V	148	8	70
	Total	491	83	

No

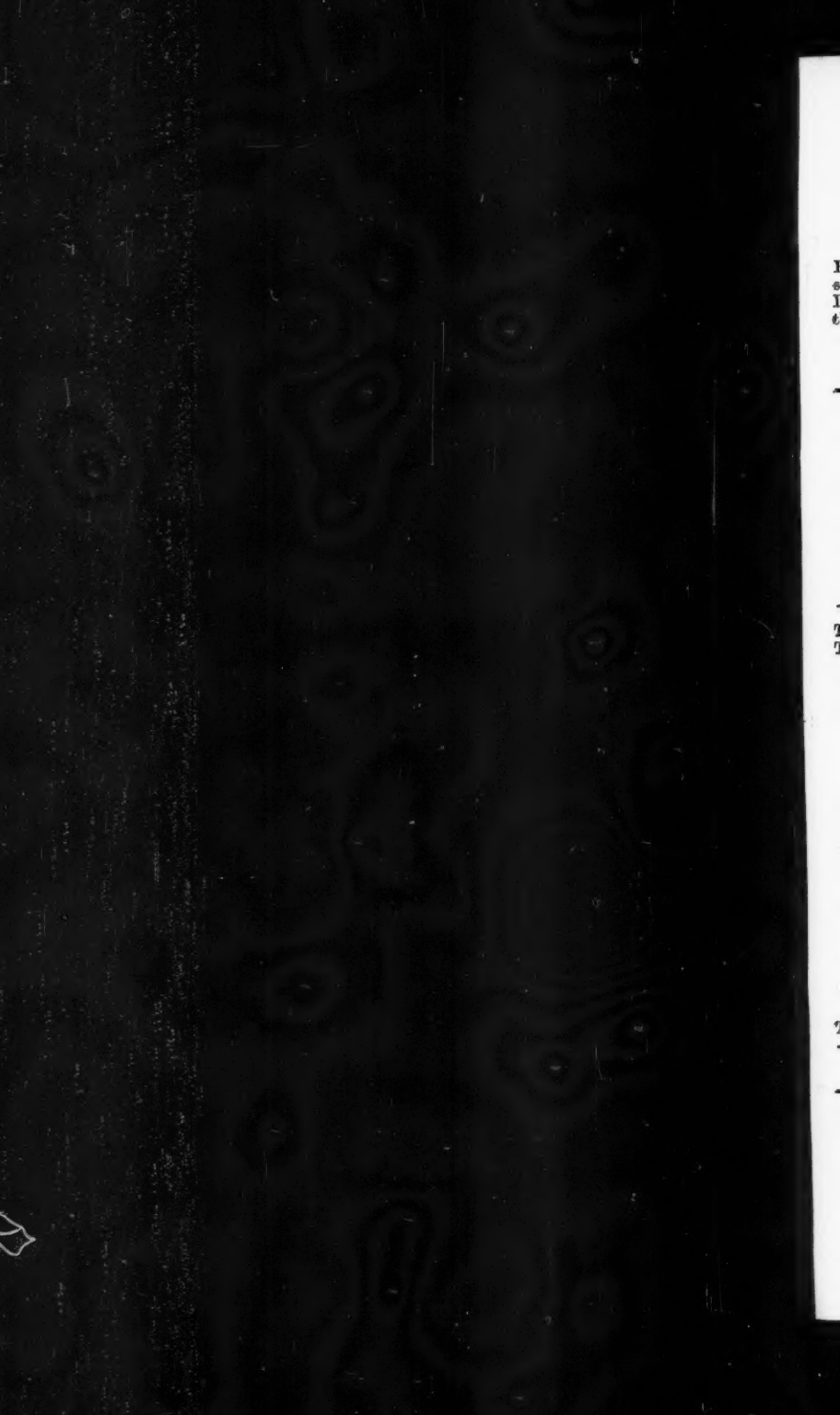
- (a.) In addition to the above, a Battalion or Half-Battalion kept
 (b.) The Quartermaster of a united Battalion would be allowed
 (c.) A united Battalion would have a canteen man, who would be
 (d.) Of the drivers, 2 would be detailed as batmen to the Colonel's
 Field or Dépôt Battalion.
 (e.) A driver is reckoned for every 2 draught or riding horses, and

I.—Train of the Engineer Regiment.

Drivers.	Wagons.					Total.	Horses.					
	Deckel.	Wagons.	Proviant or Hust-wagons.	Company tool wagons.	Section tool wagons.		Riding.		Draught.	Spare draught.	Total.	
							Two-	Four-				
												Horsed.
2	..	..	..	..	..	..	1	4	..	..	5
0	5	..	..	..	..	5	8	15	10	..	33
00	..	..	20	20	80	120	40	10	480	40	570
0	..	..	2	2	8	12	4	..	48	4	56
1	..	..	..	..	..	..	1	2	..	..	3
3	3	35	..	..	..	38	4	..	146	..	150
6	43		22	22	88	175	58	31	684	44	817	
2	..	..	..	..	..	..	1	4	..	..	5
0	5	..	..	..	..	5	8	15	10	..	33
00	..	..	20	20	80	120	40	10	480	40	570
0	..	..	2	2	8	12	4	..	48	4	56
1	..	..	..	..	..	..	1	2	..	..	3
8	8	70	..	..	..	78	10	..	296	..	306
1	83		22	22	88	215	64	31	834	44	973	

NOTES.

If Battalion kept together, would have a country wagon for carrying meat.
 could be allowed a riding horse, the property of the public.
 an, who would be obliged to bring his own wagon.
 en to the Colonel Commanding the Regiment, and 1 man to the Officer Commanding
 riding horses, and for every spare horse.



9 non-com. officers and 33 men are furnished by the 1st and 3rd Field Battalions.

4 " 14 " " 2nd Field Battalion.

4 " 14 " " 4th "

4 " 17 " " 5th "

Besides the above, the Reserve Engineer Companies at Theresienstadt furnish the Engineer Direction in that place with 2 men borne on the establishment, and similarly 1 non-commissioned officer and 12 men are furnished to the Engineer Direction at Olmütz, and the same number to the Engineer Direction at Cracow, by the Engineer troops quartered in those places. These are relieved every month.

TABLE V—(continued).

From the 2nd Regiment of Engineers.	With carbines.		Without carbines.		Total.
	Sergeant-majors, or sergeants, or corporals.	Lance - corporals or sappers.	Sergeant-majors, or sergeants, or corporals.	Lance - corporals or sappers.	
The War Ministry .....	..	..	1	..	1
The Engineer Direction at Vienna	1	4	..	..	5
" " Linz	1	2	..	..	3
" " Graz	1	2	..	..	3
" " Malborgeth (Klagenfurt) ..	1	2	..	..	3
" " Buda-Pesth ..	1	2	..	..	3
" " Fünfkirchen ..	1	2	..	..	3
" " Pressburg	1	2	..	..	3
" " Komorn	2	18	..	..	20
" " Kashau	1	2	..	..	3
" " Miskolez	1	2	..	..	3
" " Temesvar	1	4	..	..	5
" " Arad	1	3	..	..	4
" " Hermannstadt ..	1	2	..	..	3
" " Karlsburg	1	3	..	..	4
" " Agram	1	2	..	..	3
" " Essegg	1	6	..	..	7
" " Peterwardein ..	1	6	..	..	7
" " Innsbruck ...	1	2	..	..	3
" " Brixen - Fran- zensfeste ...	1	2	..	..	3
" " Trent	2	6	..	..	8
The Engineer Chief Park at Vienna .....	..	..	1	..	1
Total	22	74	2	..	98

10 non-com. officers and 30 men are furnished by the 1st and 3rd Field Battalions.

5 " 14 " " 2nd Field Battalion.

4 " 15 " " 4th "

5 " 14 " " 5th "

PART II.—THE PIONEERS.

THE PIONEER REGIMENT (DAS PIONNIER-REGIMENT).

Peace Organization.

The Pioneers are organized in a single Regiment. It consists in peace of a Regimental Staff, and 5 Field Battalions of 4 Field Companies, a Reserve Company, a Depot Company, and a Store Reserve (*Zeugs-Reserve*) each. In peace the Depot Companies exist in Cadre only. The Field Battalions are numbered 1 to 5, and the Field Companies 1 to 20. The Reserve Companies, Depot Companies, and Store Reserves bear the numbers of their respective Field Battalions.

The Regiment also includes a Pioneer Store Depot which, on mobilization, would form 2 Field Store Depôts.

The Regimental Staff consists of a Colonel in Command, 2 Captains, an Adjutant (subaltern), 2 Paymasters, a Surgeon, 4 non-commissioned officers, and 7 servants.

A Battalion Staff consists of a Field Officer in Command, an Adjutant (subaltern), a Paymaster, a Surgeon, 2 non-commissioned officers, and 4 servants.

A Field Company consists of 4 Officers, 16 non-commissioned officers, and 101 lance-corporals and men. A Reserve Company consists of 1 Officer, 8 non-commissioned officers, and 12 lance-corporals and men. A Depot Company Cadre consists of 2 Officers, 3 non-commissioned officers, and 4 men; and a Store Reserve of 1 Officer, 2 non-commissioned officers, and 4 men.

The total peace establishment of a Battalion is 24 Officers and 507 non-commissioned officers and men, and of the Regiment is 127 Officers and 2,546 non-commissioned officers and men.

Details of the establishment are given in Tables I and II.

Officers.

The Officers of the Pioneer Regiment form a special service by themselves, and are shown in the Army List as either doing duty with the Regiment or employed in various ways, but none are employed in the Engineer Directions, that is to say, technically as Engineer Officers.

The Army List of 1885 gives the number of Officers belonging to the Regiment as 2 Colonels, 4 Lieutenant-Colonels, 7 Majors, 27 First Class Captains, 12 Second Class Captains, 58 First Lieutenants, 63 Second Lieutenants, and 33 Cadets. Of the latter 20 are Acting-Officers.

Of these, 4 First Lieutenants, 29 Second Lieutenants, and 1 Cadet are Reserve Officers.

One Colonel, 2 Lieutenant-Colonels, 3 Majors, 23 First Class Captains, 10 Second Class Captains, 43 First Lieutenants, 34 Second Lieutenants, and 32 Cadets are actually shown as doing duty with the Regiment. The remainder are attached to the General Staff (3 Captains), the Railway and Telegraph Regiment, and the Technical Committee at the War Ministry, or employed as instructors at the Pioneer Cadet School at Hainburg, the Technical Military Academy, &c.

Pioneer Officers nearly all come from the Pioneer Cadet School at Hainburg near Vienna, though some get commissions from the Technical Military Academy at Vienna.

The Cadet School at Hainburg has an establishment of 140 students. The admission of candidates takes place annually in September in batches of

about forty. Candidates must have passed the fifth class in *Civil-Real-Schulen* or *Gymnasien-Schulen*; the course is nominally three years.

The Regulations for appointment and promotion are the same as in the Infantry, Rifles, and Cavalry. Up to the rank of First Lieutenant inclusive, the Officers of the Pioneer Regiment form their own *Concretual-Stand*, or lists for promotion either by seniority or selection, but above this rank they are borne on the general lists of the Infantry and Rifles (see under Engineer Officers, p. 801).

Pioneer Officers do not attend the Advanced Engineer Class, but the Field Officers' Class (*Stabs Officers' Curs*)—an institution for the Infantry, Rifles, and Cavalry to enable Officers to qualify for promotion—and the same rules apply to them as to the Officers of these Arms.

The Colonel in peace commands the Regiment in every detail, and his duties and responsibilities are laid down in the "*Dienst Reglement für das K.K. Heer*" and other Special Regulations. Certain powers are, however, delegated to the Officers Commanding detached Battalions, and these are precisely the same as in the case of the Engineer Regiments, to which allusion has already been made.

A Battalion is commanded by a Lieutenant-Colonel or a Major, and his duties as regards military, administrative, and training matters, are much the same as those described in the case of the Officers Commanding Engineer Battalions.

A Field or Depot Company, a Store Reserve, or a Pioneer Store Depot is commanded by a Captain, but a Reserve Company by a subaltern.

There is an Adjutant to the Regiment and an Adjutant to each Field Battalion—all subalterns.

The Officers' uniform is the same colour as those of the men, with the exception of the forage cap, which is of the Infantry pattern. The pattern of the uniform is that known in Austria as the German Infantry, and the distinctions of rank and other details are as in the Infantry or Rifles.

For duties and responsibilities of Pioneer Officers when acting with Engineer Officers (see under Engineer Officers, p. 805).

Peace Quarters and Recruiting.

The stations of the Regiment are chosen with a view to facilitate recruiting and training, and may be considered as permanently fixed. The Battalions are always kept together unless under very exceptional circumstances.

The present stations of the Regiment are :—

Headquarters and the 5th Battalion at Klosterneuburg.

1st Battalion..... „ Presburg.

2nd „ „ Linz.

3rd „ „ Prague.

4th „ „ Pettau.

The Pioneer Store Depot is at Klosterneuburg, with a detachment at Sharnstein (Upper Austria) commanded by an Officer.

Like the Engineers, the Pioneer Battalions are each recruited from certain districts.

The 1st Battalion at Presburg draws its recruits from Hungary, the 2nd Battalion at Linz from Upper and Lower Austria and Salzburg, the 3rd Battalion at Prague from Bohemia, the 4th Battalion at Pettau from Hungary, Croatia, and Slavonia, and the 5th Battalion at Klosterneuburg from Upper and Lower Austria, Salzburg, Moravia, Silesia, Styria, Carinthia, Carniola, Istria, Goritz, Gradiska, and Trieste.

The annual recruit contingent for the Pioneer Regiment is about 880 men.

As in the Engineers, drivers and bätmen are provided for mobilization by the transfer, by direction of the War Ministry, of Reserve men of the Cavalry.

The following are the rules observed in selecting men as recruits for the Pioneers.

The minimum standard is 1·68 metres (5 feet 6 inches) and the man must be sturdily built, and able to read and write, or at any rate intelligent enough to be easily taught. Care is taken that recruits are sound as regards hearing. Men that have passed the *Real-Schulen* or tradesmen may be taken at a standard as low as 1·58 (5 feet 2 inches) and sailors and boatmen, if they are strong and muscular, at the *minimum* standard fixed for the Army, or 1·554 metres (5 feet 1 inch).

The trades of recruits that are most desirable are sailors, boatmen, shipwrights, boatbuilders, fishermen, and raftsmen, and 45 per cent. of the contingent should consist of men of these callings; 15 per cent. should consist of carpenters, and the remainder of joiners, wheelwrights, packers, wood cutters, blacksmiths, locksmiths, tinsmiths, fitters, file cutters, navvies, masons, bricklayers, rope-makers, painters, and collar-makers, with the usual proportion of tailors and shoemakers.

The annual recruit contingent joins nominally on the 1st October. The distribution of the recruits to the Field Companies is left to the Colonel Commanding the Regiment, the various trades being always kept in the same proportion. Casualties in the *Depôt* Company Cadres and in the Store Reserves are at once filled up, but in other fractions of the Regiment twice a year—in the autumn and spring.

The number of men serving beyond their compulsory time and re-engaging annually, from Cadet-Acting-Officer downwards, must not exceed 300 in the Regiment altogether.

The requirements in drivers and bätmen are annually filled up in the autumn at the furlough season, by the transfer of Reserve men from the Cavalry, by order of the War Ministry.

The Colonel has to see that the whole requirement in the non-commissioned ranks for the Regiment on a war footing is forthcoming in the Reserve with a surplus of 6 per cent.

The total roll (*Grundbuchsstand*) of all parts of the Regiment is readjusted every year at the furlough season, so that in case of mobilization the increase in the various fractions would be evenly distributed. The total roll of the Field Companies must show besides their fixed war establishment, an excess of men equal to the annual recruit contingent. The total roll of the Reserve Companies, Store Reserves, and Pioneer Store *Depôt* should show, in addition to the total War Establishment, a surplus of 6 per cent. in both non-commissioned officers and men.

All excess beyond the above is transferred to the *Depôt* Companies.

The roll of the *Depôt* Companies must show sufficient non-commissioned officers and lance-corporals for their maximum strength, with an excess of 6 per cent.

Certain Reserve men in excess of the requirements of the Pioneer Regiment are annually transferred to the Railway and Telegraph Regiment, for duty with the Field Telegraph Detachments.

The *Depôt* Company Cadre of a Battalion has to keep its own roll as well as that of its Battalion, showing all non-commissioned officers and men not actually serving. It has charge of all stores and *matériel*, arms, accoutrements, and field equipment, including transport, required by its Battalion for mobilization; the book-keeping in connection with this is seen to by the subaltern Officer of the Cadre. Officers of the Cadre have from time to time to keep up their training, without interfering with their *Depôt* duties.

The Store Reserves have charge of the Bridge Trains and such like field equipment of their respective Battalions. They have also charge of such stores as are used in peace for training purposes.

The Pioneer Regiment is, like the Railway and Telegraph Regiment, immediately under the Chief of the General Staff in technical and military matters, but under the War Ministry in administrative business. In matters of discipline, except in certain questions reserved for the Colonel in command, the fractions of the Regiment are under the Generals Commanding the Army Corps Districts in which they happen to be, through the Officers commanding the Brigades and Divisions they belong to.

The Regimental Staff, with the Battalion stationed with it, and each detached Battalion, form in peace distinct independent corps for pay and accounts, directly responsible to the Intendanz of the Military Territorial Command concerned, and have each their own *Verwaltungs-Commission*, and *Cassa-Commission*, or Boards for Administration, Pay, and Accounts.

The *Verwaltungs-Commission* at the Headquarters of the Regiment has charge of and keeps the accounts connected with the arms, clothing, equipment, transport, &c., of the Regimental Staff, and the Battalion quartered with it, and the *Verwaltungs-Commissionen* of detached Battalions, similar duties as regards their respective Battalions, but the *Verwaltungs-Commission* at Headquarters has in addition to keep and check the rolls (*Hauptgrundbuchs-stand*) of the various fractions of the Regiment as well.

Arms, Clothing, and Accoutrements.

On a war-footing only about 2 out of 3 of the rank and file are armed with carbines, but for details on this point see Table IV.

The carbine, bayonet, and sword (*Pionnier-Säbel*) are the same as those described for the Engineers. Acting-Officer-Cadets wear the infantry Officer's sword, armourers wear the infantry non-commissioned officer's sword, and all others (servants and bätmen excepted) are armed with the Pioneer's sword.

Non-commissioned officers armed with the carbine carry 20 rounds, and privates and lance-corporals 30 rounds each in the field. The ammunition is carried in a pouch on the waistbelt in front.

The uniform, like that of the Engineers, is that known as the German Infantry pattern in Austria. The tunic, blouse, jacket, and trousers are of a blue-grey colour, and the facings, trouser seams, &c., green; the buttons are of white metal and plain. The schako and forage cap (blue-grey) are of the Infantry pattern. The great coat and hood are of the Infantry pattern, the former having green *paroli*. The remaining articles of the kit, as well as distinctions of rank, are the same as in the Infantry. The belts are the same as in the Engineers.

The knapsack is of the Infantry pattern, but for men armed with carbines who carry each an intrenching tool, there is a conically shaped hole, or leather pipe, passing through it from top to bottom, through which the helve of the tool is passed. Men not armed with carbines carry two or more tools slung with straps.

As in the other dismounted branches of the Austrian Service, the schako and tunic are not taken into the field, the service dress being the blouse and forage cap.

The rations carried in the field are the same as described in the case of the Engineers. A Pioneer Battalion, with its 8 Bridge Trains, if united, would be allowed 10 live oxen for 4 days' consumption.

The total weight carried by the men in peace or war varies according to the tools and arms carried. The heaviest weight carried in the field is that of

the Pioneer armed with the carbine and carrying a knapsack and a pickaxe, in which case it is 24.39 kilogrammes, or 52 lbs. 14 oz.

Training.

The theoretical and practical training of the Pioneer Regiment is laid down in the "*Instruction für die Truppen Schulen des K. K. Heeres*," Part V, and other Special Regulations.

The Companies should be dismissed company drill by the end of June, and the Battalions battalion drill by the end of August.

The technical preliminary training of recruits should enable them to be employed as useful workmen in the various branches of a Pioneer's duties by the end of June.

The training of the Field and Reserve Companies is the same in every respect.

Non-commissioned officers or men who show themselves skilful in the handling of boats, &c., are given the title of "*Steuermann*," and are shown as such on the various active and reserve rolls. They wear a distinguishing badge, like the marksman's badge in the Infantry. It is something like an aiguillette, and is fastened to the button of the coat.

Men of the required trades are transferred from the Field Companies to the Store Reserve and Pioneer Store Dépôt, after satisfying all requirements as regards training.

Non-commissioned officers and men in the 2nd, 4th, and 6th Reserve year's service, are annually called up for training after the harvest. The period during which this training lasts is annually fixed by the War Minister. Reserve men as a rule always join the detachment on the roll of which their names are borne.

One-year volunteers who have passed into the Reserve, as Reserve Officers, are called out for three trainings during their Reserve Service, but Officers proper, in the Reserve, with the respective Reserve contingents, but never for more than four weeks at a time.

WAR ORGANIZATION.

The Regiment of Pioneers would form on mobilization :—

- a. A Regimental Staff.
- b. 5 Battalion Staffs.
- c. 20 Field Companies.
- d. 5 Reserve Companies.
- e. 5 Store Reserves.
- f. 2 Field Store Dépôts (from the Pioneer Store Dépôt at Klosterneuburg).

The Regimental Staff would be the same as in peace.

A Battalion Staff would comprise 5 Officers and 13 non-commissioned officers and men.

A Field or Reserve Company would comprise 5 Officers, 25 non-commissioned officers, 192 lance-corporals and privates (11 of these being drivers), 34 horses, and 7 wagons.

A Store Reserve would comprise 2 Officers, 5 non-commissioned officers, and 46 lance-corporals and privates.

A Field Store Dépôt would comprise 2 Officers, 10 non-commissioned officers, and 25 lance-corporals and privates.

The total strength of the Regiment, when mobilized, would be 181 Officers, 7,092 non-commissioned officers and men, and 676 horses. The Regiment takes annually a recruit contingent of some 880 men, and has 10 such contingents to fall back on, giving, according to the same calculation as we used in the case of the Engineers, some 7,080 men. As the number of trained

Pioneers proper required would be only about 6,750, there would thus be an excess of 330 men.

The Colonel in command would, on mobilization, join the Headquarter Staff of the Armies in the Field (*Armee-Ober-Commando*) with one of the two Captains on the Staff of the Regiment. He would then act as adviser or assistant to the Chief of the General Staff in questions concerning his branch of the service, still retaining the management of certain matters connected with promotion, &c., of the Officers, &c., of the Regiment.

The administrative management of the Regiment is transferred, on mobilization, to the Field Officer in command at the peace station of the Headquarters of the Regiment.

The Dépôt Company, on mobilization, takes over from its Battalion such men whose training is considered incomplete, and from its Store Reserve, charge of all stores and *matériel* not required for the field. The Captain commanding a Dépôt Company in peace is not, unless under very exceptional circumstances, changed on mobilization.

The number of men in a Dépôt Company may vary. In the first place, the number of untrained men that it would take over on mobilization would not always be the same. There must be, however, always 16 first-class Pioneers in a Dépôt Company at the very least. The number of first and second-class Pioneers, may, under certain circumstances, be as high as 300. (See Table III.)

As a rule, there would be a Field or Reserve Pioneer Company with two Bridge Trains and an Advanced Guard Bridge Train, to every Army Corps, but no Pioneers enter into the normal composition of Divisions.

The remaining Companies would be kept with the Reserves of Armies. Every Army would have a Pioneer Store Reserve. The Pioneer Store Dépôt would be given a strength, on mobilization, of 5 Officers, 30 non-commissioned officers, and 147 lance-corporals and privates. It would have to form 2 Field Pioneer Store Dépôts.

Field Equipment.

The Field Equipment of the Pioneers is by Regulation divided under the following headings:—

- a. The Portable Equipment.
- b. The Company tool and store wagons (*Requisiten-Wagen*).
- c. The Bridge Trains (*Kriegsbrücken-Equipagen*).
- d. The Advanced Guard Bridge Trains (*Vorhut-Brücken-Trains*).
- e. The *matériel* of the Store Reserves.
- f. The *matériel* of the Field Pioneer Store Dépôt.
- g. The Pioneer Store Dépôt at Klosterneuburg.

The Portable Equipment of the Field and Reserve Companies is intended for hasty intrenchments, timber work, &c., of the simplest kind in the field, and with it 126 men can be employed at earth works, and 72 at timber work, without using the Pioneer's sword. All Pioneers armed with carbines (with the exception of the Company shoemaker) carry an intrenching tool of some kind, and Pioneers armed with side-arms only ($\frac{1}{3}$ of the war establishment) either carry 2 intrenching tools, or a set of carpenter's tools.

The Portable Equipment is invariably carried in the field except when the likelihood of work having to be done is quite out of the question, when it might be carried on the Company tool and store wagons or other vehicles. Under certain circumstances, for instance with the prospect of hard work in view, the knapsacks might be carried on country carts.

In peace the Portable Equipment is occasionally carried for practice.

The Portable Equipment of a Field or Reserve Company consists of—

53 pickaxes,
 73 shovels,
 20 large axes,
 20 small axes,
 4 cross-cut saws,
 4 frame saws,
 8 chain saws,
 54 Pioneer small tool cases.

The 54 tool cases contain 12 files of various kinds, 12 chisels, 4 saw sets, 36 gimblets and augers, 8 rules, 131 lashings, 104 dogs, and 1,804 nails and spikes of various sizes.

The two Company tool and store wagons (*Requisiten-Wagen*) carry 6 pickaxes, 20 shovels, 30 axes, and 8 saws, and in addition, besides other smaller tools and stores, 4 field forges with coals and iron, and 30 kilogrammes of dynamite with fuzes, wire, firing apparatus, &c.

This is exclusive of tools, stores, and appliances carried by the Bridge Trains, as every Company is supposed to have sufficient equipment to repair broken bridges, or throw field bridges without the assistance of these.

The *Pioneer Mountain Equipment* is merely the Portable Equipment and stores of a Field or Reserve Company, pack animals being used instead of the Company tool and store wagon, and provision made for carrying half the knapsacks of the Company.

A *Bridge Train* has sufficient equipment to throw an ordinary light field bridge of 53 metres, using either fixed or floating supports. The carriages, teams, &c., are given in Table VI.

Each of the 5 Pioneer Battalions has 8 of these Trains kept in peace by their respective Store Reserves. There are besides, in peace, 16 Reserve Bridge Trains in charge of the Reserve Store Dépôt intended either for such Reserve Companies as might be formed in war, or as a general Reserve for the Field Companies. The Bridge Trains are numbered consecutively, Nos. 1 to 8 belonging to the 1st Field Battalion, 9 to 16 to the 2nd Field Battalion, and so on. The Reserve Bridge Trains are numbered 41 to 56.

The Bridge Trains would be horsed by Train Squadrons Nos. 65 to 75; that is to say, two squadrons for the 8 Bridge Trains of each Battalion, and one (No. 75) for the Reserve Bridge Trains Nos. 41 to 44, so that each Train would have a *Zug* of a squadron complete. Reserve Bridge Trains Nos. 45 to 56 would, if necessary, be horsed by hired teams.

The Headquarters of the Train Squadrons furnishing teams for the Bridge Trains would be attached by the Officer Commanding the Pioneer Battalion, to such Bridge Trains as had the most numerous Train (*personnel* and horses).

As long as a Bridge Train is with the Pioneer party to which it is attached for the time, the Officer commanding the Train is under the orders of the Officer commanding the Pioneers, but when it is separated from it, and is only accompanied by its own Pioneer escort, the Officer commanding the Train is in command. When a Bridge Train is marching with a Pioneer party, the Train party belongs to the latter for rations.

Bridge Trains would, in the field, be only taken from the Army Reserves and given to Army Corps or to the Pioneer Companies of the same (as a rule two to a Company), as circumstances required, or forwarded to points where large bridging operations appeared necessary.

A Bridge Train equipped for the field would receive a sergeant-major, a corporal in charge of stores, 2 smiths, and a wheelwright of the Pioneers, besides an escort of at least 2 lance-corporals and 12 Pioneers from the Company to which it was attached.

The Train *personnel* would comprise in all 1 subaltern Officer, 72 non-

commissioned officers and men, and 106 horses. The total number of carriages is 19. (See Table VI.)

Advanced Guard Bridge Trains are intended for minor bridging operations such as the crossing of canals, brooks, wet ditches, &c. A Train of this description has sufficient equipment to establish an ordinary light bridge of 13·3 metres with fixed supports. The carriages, teams, &c., are given in Table VI.

As a rule there would be an Advanced Guard Bridge Train to each Army Corps belonging to its Pioneer Company. It would then belong for pay and accounts to the Store Reserve of the Battalion to which this Company belonged.

There are 14 of these Trains, numbered consecutively. Nos. 1 and 2 belong for pay and accounts to the Store Reserve of the 5th Battalion, Nos. 3 and 14 to that of the 2nd Battalion, Nos. 4 and 5 to that of the 1st Battalion, Nos. 8 and 9 to that of the 3rd Battalion, and Nos. 7 and 13 to that of the 4th Battalion. Nos. 6, 10, 11, and 12 belong to the Pioneer Store Dépôt. On mobilization they would be formed by these.

Each Advanced Guard Bridge Train would be given a permanent party of 1 non-commissioned officer and 2 Pioneers from the Store Reserve forming it. Those formed by the Pioneer Store Dépôt would receive these parties from the 5th Store Reserve of the 5th Battalion. The Train detachment would be furnished by the 1st *Zug* of the Train Squadron quartered at the Headquarters of the Army Corps, and would comprise 1 sergeant-major and 8 men with 13 horses, the total number of carriages being 3. The latter are furnished by the Store Reserves concerned. (See Table VI.)

The bridging *matériel* at present in use differs but little from the original Birago pattern introduced in the year 1841, but the pontoon is now made of steel instead of iron. The original pontoon was made of wood, and afterwards of iron. This change took place in 1859, the advantage of the iron pontoon being that it does not leak when dry, is stronger and more simple in construction, and weight for weight is more buoyant than the wooden one. The steel pontoon has the latter advantage in a higher degree.

The pontoon is in two parts, a bow piece and a middle piece, which can be coupled together. The former is 4·266 metres long (the bow itself being 1·051 metres long), and the latter 3·476 metres long, the two when joined together making a boat 7·742 metres long. The breadth on top is 1·90 metres and at the bottom 1·74 metres. The bow is 0·987 metre high, and the depth of the body 0·89 metre. The weight of the bow piece is 414·40 kilogrammes, and of the body, 397·60 kilogrammes, the weight of the two when joined being therefore 812 kilogrammes. The sinking or extreme weights that can be taken by the two parts are 4,856 and 4,882 kilogrammes respectively, that of the two joined together being therefore 9,738 kilogrammes.

The baulks are of pine, 7·08 metres long, and 0·118 by 0·158 metre in section, and have oak cleats at each end let into the pine and secured by two iron straps. There is a small iron ring at either extreme end. The weight of a baulk is 67·20 kilogrammes. The baulks do not rest on the gunwales of the pontoons, but on a central bearer running fore and aft in the pontoon and supported by transoms resting on the gunwales, and on a support resting on the joined ends of the two parts. The length of the bearer is 4·134 metres, and its section is 0·118 by 0·158 metre. It is made of pine and weighs 42 kilogrammes. The transoms are similarly of pine and weigh 15·64 kilogrammes each; they are 1·949 metres long and 0·066 by 0·158 metre in section. The support at the junction of the two parts is also of pine; it weighs 5·60 kilogrammes, and is 0·421 metre long, and 0·158 metre square in section.

The chasses are either half or whole. They are of fir or pine, and weigh

16.80 and 9.80 kilogrammes respectively. Their length and thickness are 3.265 and 0.04 metres, and they are 0.28 and 0.154 metre broad respectively; like the legs of the trestles, the half chesses may be used as ribbands.

The trestles consist each of two legs, a transom, and two suspension chains. The wood used is pine.

The transom is 5.131 metres long, and 0.224 by 0.158 metre in section in the middle, and 0.224 by 0.21 metre at either end. It weighs 105.665 kilogrammes. The legs are of four different lengths, 2.528, 3.792, 5.056, and 6.327 metres, and weigh 14.192, 19.145, 26.355, and 32.655 kilogrammes respectively. A suspension chain is made in 17 links, is 2.053 metres long, and weighs 14.84 kilogrammes.

There are 15 wagons in a *Bridge Train*. Each of these takes half a pontoon, and 8 six-horsed wagons (*Balken-Wagen*) carry besides baulks, 4 four-horsed wagons (*Bock-Wagen*), trestles, and 2 two-horsed wagons (*Requisiten-Wagen*), various stores and appliances. The wagons themselves differ very slightly in pattern, and they are all close locking. The weight of a *Balken-Wagen* with stores is 2,088 kilogrammes, and that of a *Bock-Wagen* with stores, 2,016 kilogrammes, complete. The weight of a two-horsed wagon with stores is 1,696 kilogrammes complete.

The stores of a *Bridge Train* enable a bridge of 8 bays to be thrown, using 7 coupled pontoons and 2 trestles, but the number of trestles carried is 8, giving 15 fixed and floating supports, or nearly double the amount that could be used together. This arrangement enables either a pontoon or trestle bridge to be used according to circumstances, or an additional length of bridge if baulks and planking were available from other sources.

The length of a bay is 6.636 metres, measured from centre to centre of two successive supports, and consequently the total length of bridge that can be thrown with the baulks and chesses carried is 53.088 metres. The bays are always of the same length. The number of baulks in a bay is 5, and the length in the clear 4.687 metres. The roadway is 3.05 metres wide in the clear.

The bridge is calculated to take Infantry in fours, Cavalry in twos, and Field Artillery and Trains by single carriages.

If the bridge is to take heavier weights than these, each pontoon would be formed of 3 coupled pieces, and 7 baulks would be used in a bay, the length of the bay and width of the roadway remaining the same.

The strength of a bridging party is put at 1 Officer, 10 non-commissioned officers, and 72 Pioneers, and the time taken to form a bridge is from $3\frac{1}{2}$ to $4\frac{1}{2}$ minutes per trestle bay, and from $2\frac{1}{2}$ to $3\frac{1}{2}$ minutes per pontoon bay.

The bridging equipment of an Advanced Guard *Bridge Train* consists of trestles, baulks, chesses, &c., carried on 1 four-horsed *Bock-Wagen*, and 2 four-horsed *Balken-Wagen*. No floating supports are used. The bridge would be in two bays, and the total length would be 13.30 metres.

With the two *Bridge Trains* and the Advanced Guard *Bridge Train* that would accompany an Army Corps, the total length of bridge that could be thrown with the stores carried would be 119.476 metres.

The *Store Reserves* are intended to replenish in time of war the various kinds of stores forming the Pioneer equipment that would be expended or lost from wear and tear. The kinds of stores that they would take with them in the field would depend on the nature of warfare contemplated, the character of the theatre of operations, &c. They would be carried in 7 equipment wagons (*Rüst-Wagen*). (See Table V.) These *Store Reserves* would as a rule be attached to the *Bridge Trains* of the Army Corps to which the Staff of the Pioneer Battalion concerned belonged.

The *Field Pioneer Store Depôts* are intended for the charge and storage of large quantities of bridging matériel of all kinds in the field, for issue to the Pioneers, and they would also act as a Reserve in second line as regards all

kinds of Pioneer Equipment, receiving the stores, as required, from the Pioneer Store Dépôt at Klosterneburg. Field Pioneer Store Dépôts would be formed as circumstances required.

The *Pioneer Store Dépôt* at Klosterneburg is an establishment that has to furnish the Pioneer Regiment with bridging matériel and all other kinds of Pioneer Stores both in peace and war. It has charge of the Reserve Bridge Trains, certain Advanced Guard Bridge Trains, and has to procure and supply both the manufactured article and raw material. In war its chief duties would be in keeping up the supply of Pioneer Stores, as these were expended.

On mobilization it would form 2 Field Pioneer Store Dépôts, as Reserves (*Reserve Anstalten*) for the Army in the field, and these would then belong to the Pioneer Regiment.

The peace and war establishments of the Pioneer Store Dépôt are as follows:—

	Peace.	War.
Captains	1	1
Subalterns	3	4
Sergeant-majors	2	4
Pay-sergeants	1	1
Sergeants	4	8
Corporals	6	14
Lance-corporals	6	10
1st class Pioneers	23	} 131
2nd " "	36	
Buglers	1	1
Officers' servants	4	5
1st class foremen of smiths	1	1
" " wheelwrights ..	1	1
" " ropemakers	1	1
Total	90	182

In peace artificers would be taken when necessary from the Field Companies, but in war as far as possible from the Dépôt Companies.

Non-commissioned officers and men are armed with the Pioneer's sword only.

The Pioneer Store Dépôt is an independent corps for pay and accounts, though it belongs in every respect to the Pioneer Regiment.

For the purchase of stores and materials it has a *Zeugs-Verwaltungs-Commission*, or Store Administrative Board, the duties of which are technical, administrative, and financial.

It keeps its own roll of furloughed and reserve men.

The Captain has general charge of everything in military, technical, administrative, and financial matters, and has to procure the timber he requires from certain forests.

One of the subalterns has charge of the workshops, the second, administrative matters and accounts, and the third, the training of the men, besides certain technical work given him from time to time. The latter Officer is supposed to be able to take over, if necessary, the duties of the first two, and must therefore acquire a knowledge of their duties.

The foremen artificers have general supervision of the work done in their respective trades, and have to see that the stores received by purchase or otherwise are of the prescribed quantity and quality.

The non-commissioned officers are either employed as storekeepers or as leading men in their respective trades. In war 3 of them would have to do duty as foremen. The Pioneers are employed either as storemen or artificers.

The general work and management of the Pioneer Store Dépôt, as well as the duties and responsibilities of the *Zeugs-Verwaltungs-Commission*, are laid down in the "*Vorschrift über die Verwaltung und Verrechnung des Pionnier-Zeugs und der Zeugs Gelder*," or Regulations for the Pioneer Store Department.

Non-commissioned officers are selected for the Pioneer Store Dépôt equally as far as possible from the Pioneer Battalions, and are mainly taken owing to their proficiency in the trades required, but no man is taken who has not been thoroughly trained as a Pioneer in one of the Companies.

The Pioneer Store Dépôt is raised to a war footing by calling in its own Reserves, and artificers may, if necessary, be transferred to it from the Reserves of the Battalions.

When the Colonel Commanding the Pioneer Regiment takes the field, the Pioneer Store Dépôt is under the Field Officer remaining behind at the Regimental Headquarters.

TABLE I.—*Peace Establishment of the Fractions of the Pioneer Regiment.*

		Field	Reserve	Depôt Company Cadre.	Store Reserve.	Pioneer Store Depôt.	
		Company.					
Officers .	{ Captains.....	1	..	1	1	1	
	{ Subalterns	3	1	1	..	3	
Non-commissioned officers and men	with carbines	{ Sergeant-majors....	2 ..	1 ..	1 —	— —	— —
		{ Sergeants	4 ..	2 —	— —	— —	— —
		{ Corporals	8 ..	4 ..	1 —	— —	— —
		{ Lance-corporals	6 ..	4 —	— —	— —	— —
		{ 1st class Pioneers ..	30 ..	2 ..	1 —	— —	— —
		{ 2nd „ „ ..	60 ..	5 ..	1 —	— —	— —
	without carbines	{ Acting-Officer-Cadets	1 117 ..	20 ..	7 ..	6 ..	83 ..
		{ Sergeant-majors....	.. ..	.. ..	.. ..	.. ..	2 ..
		{ Pay-sergeants.....	1 ..	1 ..	1 ..	1 ..	1 ..
		{ Sergeants .....	.. ..	.. ..	.. ..	.. ..	4 ..
		{ Corporals .....	.. ..	.. ..	.. ..	1 ..	6 ..
		{ Lance-corporals ....	.. ..	.. ..	.. ..	.. ..	6 ..
		{ 1st class Pioneers...	.. ..	.. ..	.. ..	3 ..	23 ..
		{ 2nd „ „ ..	.. ..	.. ..	.. ..	.. ..	36 ..
		{ Buglers.....	1 ..	.. ..	.. ..	.. ..	1 ..
		{ Drivers	— —	— —	— —	— —	— —
		{ Officers' servants ...	4 ..	1 ..	2 ..	1 ..	4 ..
Smiths (1st class foremen)....	.. ..	.. ..	.. ..	.. ..	1 ..		
Wheelwrights „ „ .....	.. ..	.. ..	.. ..	.. ..	1 ..		
Ropemakers „ „ .....	.. ..	.. ..	.. ..	.. ..	1 ..		
Total		121	21	9	7	90	

	Staff							
	Colonel Commanding the Regt.	Lieutenant-Colonels or Majors commanding Battalions.	Captains.	Regimental Adjutants.	Battalion Adjutants.	Surgeons.	Paymasters.	Corporal clerks.
Regimental Staff	1	..	2	1	..	1	2	2
1st Battalion .....	..	1	..	..	1	1	1	1
2nd „ .....	..	1	..	..	1	1	1	1
3rd „ .....	..	1	..	..	1	1	1	1
4th „ .....	..	1	..	..	1	1	1	1
5th „ .....	..	1	..	..	1	..	..	..
Total Regiment	1	5	2	1	5	5	6	6
Pioneer Store Department .....	..	..	..	..	..	..	..	..
Grand total.....	1	5	2	1	5	5	6	6

(a.) 22 Captains are First Class Captains, and 48 of the sub

TABLE II.—*Peace Establishment of the Pioneer*

Staff.																				
Surgeons.	Paymasters.	Corporal clerks.	Armourers.	Staff-sergeants.	Officers' servants.	Horses.		Total.			Officers.		Non-commi							
						Public property.	Private property.	Officers.	Non-commissioned officers and men.	Horses.	Captains.	Subalterns.	With carbines.				Pioneers.		Acting-Officer-Cadets.	
1	2	2	..	1	7	1	3	7	11	4	Sergeant-majors.	Sergeants.	Corporals.	Lance-corporals.	1st class.	2nd class.		..
1	1	1	1	..	4	1	2	4	6	3	6	14	10	18	37	28	123	246	4	
462																			4	
1	1	1	1	..	4	1	2	4	6	3	6	14	10	18	37	28	123	246	4	
462																			4	
1	1	1	1	..	4	1	2	4	6	3	6	14	10	18	37	28	123	246	4	
462																			4	
1	1	1	1	..	4	1	2	4	6	3	6	14	10	18	37	28	123	246	4	
462																			4	
..	..	..	1	..	2	1	2	2	3	3	6	14	10	18	37	28	123	246	4
462																			4	
5	6	6	5	1	25	6	13	25	38	19	30	70	50	90	185	140	615	1230	20	
2,310																			20	
..	..	..	..	..	..	..	..	..	..	..	1	3	..	..	..	..	..	..	..
2,310																			20	

NOTES.

148 of the subalterns First Lieutenants.

(b.) Half the pay-sergeants rank as sergeant-maj

II.—Peace Establishment of the Pioneer Regiment.

Fractions of the Regiment.																				
Officers.		Non-commissioned officers and men.																1st class artificers.		
Captains.	Subalterns.	With carbines.						Acting-Officer-Cadets.	Without carbines.										Smiths.	Wheelwrights.
		Sergeant-majors.	Sergeants.	Corporals.	Lance-corporals.	Pioneers.			Sergeant-majors.	Pay-sergeants.	Sergeants.	Corporals.	Lance-corporals.	Pioneers.		Buglers.	Drivers.	Officers' servants.		
..	..	..	..	..	..	1st class.	2nd class.	..	..	..	..	..	..	..	1st class.	2nd class.	..	..	..	..
6	14	10	18	37	28	123	246	4	..	7	..	1	..	3	..	4	..	20	..	..
462								35										..	..
6	14	10	18	37	28	123	246	4	..	7	..	1	..	3	..	4	..	20	..	..
462								35										..	..
6	14	10	18	37	28	123	246	4	..	7	..	1	..	3	..	4	..	20	..	..
462								35										..	..
6	14	10	18	37	28	123	246	4	..	7	..	1	..	3	..	4	..	20	..	..
462								35										..	..
6	14	10	18	37	28	123	246	4	..	7	..	1	..	3	..	4	..	20	..	..
462								35										..	..
30	70	50	90	185	140	615	1230	20	..	35	..	5	..	15	..	20	..	100	..	..
2,310								275										1	1	
1	3	..	..	..	..	..	..	..	2	1	4	6	6	23	36	1	..	4	1	1
—								83										1	1	
31	73	2,310						20	358										1	1

NOTES.

(b.) Half the pay-sergeants rank as sergeant-majors and the remainder as sergeants. The number of horses, priv

Officers' servants.	1st class artificers.			Horses, private property.	Total.			Grand total.			Total combatants.	
	Smiths.	Wheelwrights.	Ropemakers.		Officers.	Non-commissioned officers and men.	Horses.	Officers.	Non-commissioned officers and men.	Horses.	Officers.	Non-commissioned officers and men.
..	..	..	..	..	..	..	..	7	4	4	4	—
20	..	..	..	2	20	501	2	24	507	5	22	470
20	..	..	..	2	20	501	2	24	507	5	22	470
20	..	..	..	2	20	501	2	24	507	5	22	470
20	..	..	..	2	20	501	2	24	507	5	22	470
20	..	..	..	2	20	501	2	24	507	5	22	470
100	..	..	..	10	100	2,505	10	127	2,539	29	114	2,350
4	1	1	1	..	4	86	..	4	86	—	—	—
	1	1	1	10	104	2,591	10	131	2,625	29	114	2,350

of horses, private property, is for which forage is allowed.

	Staff										
	Colonel.	Lieutenant-Colonels and Majors.	Captains.	Regimental Adjutant.	Battalion Adjutants.	Quartermaster.	Surgeons.	Paymasters.	Corporal clerks.	Armourers.	Staff-sergeants.
Regimental Staff	1	1	2	1	..	..	..	2	3	..	1
1st Battalion .....	..	1	..	..	1	..	..	..	..	1	..
2nd „ .....	..	1	..	..	1	..	..	..	..	1	..
3rd „ .....	..	1	..	..	1	..	..	..	..	1	..
4th „ .....	..	1	..	..	1	..	..	..	..	1	..
5th „ .....	..	1	..	..	1	..	..	..	..	1	..
Total Regiment	1	6	2	1	5	..	..	2	3	5	1
Pioneer Store Dépôt .....	..	..	..	..	..	..	..	..	..	..	..
2nd Field Pioneer Store Dépôts ..	..	..	..	..	..	..	..	..	..	..	..
Grand Total	1	6	2	1	5	..	..	2	3	5	1

- (a.) Of the Captains, 27 are First Class Captains, and of the subalterns, 60 are First Lieutenants.
- (b.) A united Battalion would be allowed in addition, 1 Quartermaster, 1 Surgeon, 1 Paymaster, 3 clerks.
- (c.) One of the Captains belonging to the Regimental Staff would accompany the Colonel.
- (d.) The Paymaster and 3 clerks would remain with the Regimental *Verwaltungs Commis*.
- (e.) Half the pay-sergeants rank as sergeant-major, the remainder as sergeant.
- (f.) For proportion of 1st and 2nd class Pioneers, see first note, Table III.
- (g.) For details of drivers and horses, see Foot-Notes (b), (c), (d), Table V.

TABLE IV.—War Establishment of the P

Staff.																									
Corporal clerks.	Armourers.	Staff-sergeants.	Drivers.	Hospital orderlies.	Officers' servants.	Horses.			Total.			Officers.		With carbines.								Acting Officer Cadets.			
						Public property.	Private property.	Draught.	Officers.	N.-C. officers and men.	Horses.	Captains.	Subalterns.	Sergeant-majors.	Sergeants.	Corporals.	Lance-corporals.	1st class Pioneers.	2nd class Pioneers.						
																				Riding.					
3	..	1	2	..	7	1	6	..	7	13	7	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	2	..	2	1	3	2	2	5	6	7	24	18	37	85	72	724						6	
..	1	..	2	..	2	1	3	2	2	5	6	7	24	18	37	85	72	724						6	
..	1	..	2	..	2	1	3	2	2	5	6	7	24	18	37	85	72	724						6	
..	1	..	2	..	2	1	3	2	2	5	6	7	24	18	37	85	72	724						6	
..	1	..	2	..	2	1	3	2	2	5	6	7	24	18	37	85	72	724						6	
..	1	..	2	..	2	1	3	2	2	5	6	7	24	18	37	85	72	724						6	
..	1	..	2	..	2	1	3	2	2	5	6	7	24	18	39	87	72	732						6	
3	5	1	12	..	17	6	21	10	17	38	37	35	120	90	187	427	360	3,628						30	
..	..	..	..	..	..	..	..	..	..	..	..	1	4	..	..	..	..	..						..
..	..	..	..	..	..	..	..	..	..	..	..	2	2	6	6	6	6	40						..
3	5	1	12	..	17	6	21	10	17	38	37	38	126	4,756								30			

NOTES.

s, 60 are First Lieutenants.

1 Surgeon, 1 Paymaster, 1 clerk, 1 Staff-sergeant as trainmaster, 1 hospital orderly, 3 Officers' servants, 2 but company the Colonel on the Headquarter Staff of the Army in the Field, and the other with the Regimental Administration Commission at the Peace Station of the Headquarters of the Regiment.

II.
V.

TABLE IV.—*War Establishment of the Pioneer Regiment.*

Fractions of the Regiment.																					
Officers.		With carbines.						Without carbines.													
Captains.	Subalterns.	Sergeant-majors.	Sergeants.	Corporals.	Lance-corporals.	1st class Pioneers.	2nd class Pioneers.	Acting Officer Cadets.	Sergeant-majors.	Pay-sergeants.	Sergeants.	Corporals.	Lance-corporals.	1st class Pioneers.	2nd class Pioneers.	Buglers.	Horses.	Officers' servants.	Smiths.		
..		
7	24	18	37	85	72	724		6	..	7	..	2	4	306	12	53	31				
		936							417												
7	24	18	37	85	72	724		6	..	7	..	2	4	306	12	53	31				
		936							417												
7	24	18	37	85	72	724		6	..	7	..	2	4	306	12	53	31				
		936							417												
7	24	18	37	85	72	724		6	..	7	..	2	4	306	12	53	31				
		936							417												
7	24	18	39	87	72	732		6	..	7	..	2	5	306	12	53	31				
		948							417												
35	120	90	187	427	360	3,628		30	..	35	..	10	20	1,530	60	275	155				
		4,692							5,085												
1	4	..	..	..	..	..		..	4	1	8	14	10	131	1	..	5		
		—							174												
2	2	6	6	6	6	40		..	..	2	..	..	..	..	..	..	4		
		64							6												
38	126	4,756						30	2,265												

NOTES.

ster, 1 hospital orderly, 3 Officers' servants, 2 butchers, and a riding horse for the Quartermaster. Instruct the Field, and the other with the Regimental Adjutant would remain at the Peace Station of the Regiment.

nt.

												Grand total.			Total combatants.		
Horses.		1st class foremen artificers.			Horses.				Total.								
..	..	Smiths.	Wheelwrights.	Ropemakers.	Riding.		Draught.	Spare.	Officers.	N.-C. officers and men.	Horses.	Officers.	N.-C. officers and men.	Horses.	Officers.	N.-C. officers and men.	
					Public property.	Private property.											
53	31	..	..	..	25	2	90	10	31	1,359	127	33	1,364	133	33	1,224
53	31	..	..	..	25	2	90	10	31	1,359	127	33	1,364	133	33	1,224
53	31	..	..	..	25	2	90	10	31	1,359	127	33	1,364	133	33	1,224
53	31	..	..	..	25	2	90	10	31	1,359	127	33	1,364	133	33	1,224
53	31	..	..	..	25	2	90	10	31	1,359	127	33	1,376	133	33	1,236
275	155	..	..	..	125	10	450	50	125	6,807	635	172	6,845	672	170	6,132
..	5	1	1	1	..	..	..	..	5	177	..	5	177	—	—	—
..	4	..	..	..	4	..	..	..	4	70	4	4	70	4	4	64
		1	1	1	129	10	450	50	164	7,054	639	181	7,092	676	174	6,196	

aster. Instructions would be given on this point at the time.

of the Regimental Headquarters with the Field Officer second in command of the Regiment.

Off
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Non-commissioned officers and men

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NOTE.—An additional sergeant-major might be shown in the place of an Acting-Officer-Cadet. In a Reserve Company a Pioneer would act as bugler. In the Store Reserve the pay-sergeant would act as storekeeper, and the corporal would have charge of storehouses and workshops. The 1st class Pioneers would act as foremen of works.

TABLE III.—*War Establishment of the Fractions of the Pioneer Regiment.*

		Field or Reserve	Depôt	Store Reserve.		Pioneer Store Depôt.	Field Pioneer Store Depôt.			
		Company.		Nos. 1 to 4.	No. 5.					
Officers ...	{ Captains..... Subalterns.....	1 4	1 3	1 1	1 1	1 4	1 1			
Non-commissioned officers and men	{ With carbines	Sergeant-majors.....	3	3	...	...	3	—		
		Sergeants.....	6	6	1	3	...	3	—	
		Corporals.....	14	14	1	3	...	3	—	
		Lance-corporals.....	12	12	...	...	...	3	—	
		1st class Pioneer 2nd " " }	108	180	4	12	...	20	—	
	{ Without carbines	Acting-Officer-Cadets	1	1	—	—	—	—	—	
		Sergeant-majors .....	...	...	—	—	4	—	—	
		Pay-sergeants	1	217	1	223	1	63	1	35
		Sergeants .....	...	...	...	...	8	—	—	—
		Corporals .....	...	...	2	2	14	—	—	—
		Lance-corporals .....	...	...	4	4	10	—	—	—
		1st class Pioneer 2nd " " }	54	...	36	36	131	—	—	—
		Buglers	2	2	...	...	—	—	—	—
		Drivers	11	—	—	—	1	—	—	—
Officers' servants.....	5	4	2	2	5	2	—	—		
1st class foremen	{ Smiths..... Wheelwrights..... Ropemakers.....	...	...	...	...	1 1 1	— — —			
	Total	222	227	53	65	182	37			

NOTE.—(a.) An extra sergeant-major would be taken on the strength in case an Acting-Officer-Cadet were deficient.

(b.) Two sergeant-majors in a Field or Reserve Company would be employed as Trainmasters, 2 corporals as storekeepers for the two Bridge Trains, and 2 privates with carbines (shoemakers), would have charge of the company transport.

(c.) If the number of 1st and 2nd class Pioneers exceeds 180 men, 1 extra corporal and lance-corporal would be added for every additional 15 Pioneers, and 1 extra sergeant for every additional 30 Pioneers, and should there be 100 additional Pioneers there would be an extra subaltern and sergeant-major.

(d.) The Store Reserves supply from their war establishment each of the Bridge Trains they form, with 2 smiths and 1 wheelwright (without carbines), and each Advanced Guard Bridge Train with 1 non-commissioned officer and 2 Pioneers (with carbines) as escorts. For the Advanced Guard Bridge Trains formed by the Pioneer Store Depot these escorts would be furnished by the Store Reserve of the 5th Pioneer Battalion.

(e.) Three non-commissioned officers in the Pioneer Store Dépôt would be 2nd class foremen artificers.

(j.) As a rule, two-thirds of the Pioneers would be 1st class Pioneers.

TABLE V.—*Train of the Pioneer Regiment in War.*

		Drivers.	Horses.					Wagons.			
			Officers' riding.		Draught.	Spare.	Total.	Deckel-Wagen, two-horsed.	Provision (Rüst-Wagen), four-horsed.	Company equipment, six-horsed.	Total.
			Public property.	Private property.							
Regimental Staff.....	2	1	4	..	..	5	—	—	—	—	—
A Battalion Staff.....	2	1	3	2	..	6	1	..	..	1	1
A Field or Reserve Company ..	11	5		18	2	25	1	1	2	5	5
A Store Reserve.....	..	2	..	..	..	2	—	—	—	—	—
A Field Pioneer Store Dépôt ..	..	2	..	..	..	2	—	—	—	—	—
Totals.	Regimental staff.....	2	1	4	..	..	5	—	—	—	—
	5 Battalion staffs.....	10	5	15	10	..	30	5	..	..	5
	20 Field Companies.....	220	90	10	330	40	500	20	20	40	80
	5 Reserve Companies.....	55	25	..	90	10	125	5	5	10	20
	5 Store Reserves .....	..	10	..	..	..	10	—	—	—	—
	2 Field Pioneer Store Dépôts	..	4	..	..	..	4	—	—	—	—

NOTES.

(a.) A Battalion, if united, would be allowed, besides the above, a country wagon for meat, and a Field Pioneer Store Dépôt 5, or if necessary more, country wagons, to carry its stores.

(b.) 1 driver is allowed for every spare horse and every 2 draught horses. The Colonel is allowed 2 drivers and every Battalion Commander 1 driver, as *bâtmen*.

(c.) The riding horses, public property, are for one of the Captains of the Regimental Staff, the Battalion Adjutant, and all Officers of Field and Reserve Companies, Store Reserves, and Pioneer Store Dépôts, with the exception of the 10 Captains mounted in peace. There would be in addition a riding horse, the property of the public, for the Quartermaster of a united Battalion. The horses, private property, are those for which field forage allowance is issued.

(d.) The 7 four-horse *Rüst-Wagen*, to carry the stores of a Store Reserve, would be furnished by the Train Squadron (bearing an even number) furnishing the teams for the Bridge Trains of the Pioneer Battalion concerned.

TABLE VI.—*Formation and Establishment of the Bridge Trains.*

			A Bridge Train.						An Advanced Guard Bridge Train.							
			Officers.	N.C. officers and men.			Horses.		Wagons.		N.C. officers and men.			Horses.		Four-horsed wagons.
				Riding.	Draught.	Spare.	Four-horsed.	Six-horsed.	Riding.	Draught.	Four-horsed.					
From the Pioneer Regt.	From the Company.	Trainmaster (sergt.-major)	1	—	—	—	—	—	—	—	—	—	—	—	—	
		Store-corporal	1	—	—	—	—	—	—	—	—	—	—	—	—	
		Smiths	2	—	—	—	—	—	—	—	—	—	—	—	—	
	From the Store Reserve	Wheelwrights	1	—	—	—	—	—	—	—	—	—	—	—	—	
		Baulk wagons .....	..	..	..	..	..	8	..	..	..	..	..	2	..
		Trestle wagons .....	..	..	..	..	..	4	..	..	..	..	..	1	..
		Store wagons .....	..	..	..	..	..	2	..	..	..	..	..	—	..
	From the Company.	N.C. officers .....	..	..	..	..	..	1	..	..	..	..	..	—	..
		Pioneers .....	..	..	..	..	..	2	..	..	..	..	..	—	..
		Lance-corporals	2	—	—	—	—	—	—	—	—	—	—	—	—	
Pioneers		12	—	—	—	—	—	—	—	—	—	—	—	—		
			Escorts.													
From the Military Train.		Subaltern	1	—	—	—	—	—	—	—	—	—	—	—	—	—
		Sergeant-major	1	—	—	—	—	—	—	—	—	—	—	—	—	—
		Sergeant	1	—	—	—	—	—	—	—	—	—	—	—	—	—
		Corporals	4	—	—	—	—	—	—	—	—	—	—	—	—	—
		Trumpeter	1	—	—	—	—	—	—	—	—	—	—	—	—	—
		Drivers	61	—	—	—	—	—	—	—	—	—	—	—	—	—
		Officers' servant	1	—	—	—	—	—	—	—	—	—	—	—	—	—
		Shoeing smith	1	—	—	—	—	—	—	—	—	—	—	—	—	—
		Smith	1	—	—	—	—	—	—	—	—	—	—	—	—	—
		Collar-maker	1	—	—	—	—	—	—	—	—	—	—	—	—	—
		Officers' riding horse	1	—	—	—	—	—	—	—	—	—	—	—	—
		N.C. officers' ditto	7	6	—	—	—	—	—	—	—	—	—	—	—
		Draught horses	96	—	—	—	—	—	—	—	—	—	—	—
		Spare ditto	2	—	—	—	—	—	—	—	—	—	—
Deckel-Wagen (1854 pattern)	1	—	—	—	—	—	—	—	—	—	
Rüst-Wagen	4	—	—	—	—	—	—	—	—	—	
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NOTES.

(a.) The establishment of a Bridge Train, with the Headquarters of the Train Squadron, would consist in addition of 1 Train Captain, 1 Surgeon, 1 Veterinary Surgeon, 1 sergeant-major, 1 pay-sergeant, 6 drivers, 3 Officers' servants, 1 wheelwright, 1 Officer's riding horse (public property), 3 riding horses (private property), 1 N.C. officer's riding horse, 4 draught horses, and one four-horsed *Deckel-Wagen*; or a total of 3 Officers, 12 non-commissioned officers and men, 9 horses, and 1 wagon.

(b.) The Train is furnished by Train Squadrons Nos. 65 to 75, i.e., 2 squadrons for the eight Bridge Trains of each Battalion, the 75th Train Squadron furnishing the Train for the Reserve Bridge Trains Nos. 41 to 44; so that each Bridge Train has then a *Zug* of a Train Squadron. Train Squadrons Nos. 66, 68, 70, 72, and 74 furnish besides each a mounted sergeant, 15 drivers, and 7 four-horsed *Rüst-Wagen* for the Store Reserves.

PART III.—VARIOUS OTHER SERVICES SOMETIMES CONNECTED WITH THE ENGINEER ARM.

Signalling.

Signalling in recognized in Austria as a useful adjunct to modern warfare, but it is not an Engineer or Pioneer service.

Field Signalling Detachments (*Feld-Signal-Abtheilungen*) would only be used, as a rule, in mountain warfare or in sieges. They have no permanent existence in peace.

To provide the necessary number of trained Officers and men that would be required in war, a Field Signalling Detachment is annually formed on the 1st July, in every Army Corps Command (except in the 1st, 5th, 6th, and 17th) and the Military Command at Zara, the 15th Army Corps Command forming two.

These Detachments are formed by the Military Territorial Authorities in places suited for signalling, and are broken up when the training is considered sufficient. In the 14th Army Corps Command the Detachment is not broken up until after the manoeuvres have been brought to a close.

A Field Signalling Detachment consists of 4 signalling stations numbered 1 to 4. The Detachment is known by the number of the Army Corps to which it belongs. The two Detachments of the 15th Army Corps are known as Nos. 15 and 16, and the Zara Detachment as No. 17.

A signal station comprises a non-commissioned officer and 4 men, with a signalling apparatus complete.

A Detachment comprises—

- 2 Subaltern officers,
- 8 Non-commissioned officers,
- 12 Lance-corporals and privates,
- 2 Officers' servants,
- 4 Sets of signalling apparatus complete,
- 1 ditto in reserve.

Transport would be provided by the Train. It would consist of 2 riding horses (without saddlery) and 5 pack animals, or a two-horsed country wagon, if the service were not for mountain warfare.

Officers and men are taken from the Infantry and Rifles stationed in the Command. Officers must have at least 3 years' service.

The men leave their arms with their Regiments, and are armed as signallers with revolvers and Pioneers' swords.

Officers and men wear a black and yellow band on the arm as a distinctive mark.

In war the Officers would be mounted, and there would be a certain number of mounted orderlies detailed for duty with every Detachment.

Officers and men are both borne on the strengths of their respective Regiments over and above the establishment in war.

Field Signalling Detachments are in war under the General Staff, and are attached for pay, rations, &c., to the Staff Troops of the Army Corps Command.

The system used is discs by day and lamps by night.

The details of the system followed, training, &c., are given in the "*Instruktion für den Feld-Signaldienst im K. K. Heere*," and the duties and organization in the "*Organische Bestimmungen für die Feld-Signal-Abtheilungen*."

The Electric Light.

The Electric Light does not appear to be of recognized military use as yet in the Austro-Hungarian Land Service.

Carrier Pigeons.

It is proposed to establish military carrier-pigeon establishments in the Tyrol, Transylvania, and Bosnia and Herzegovina; but beyond giving prizes to private breeders, the Austrian Government has as yet done nothing in the organization of the carrier-pigeon service.

Balloons.

No attempt has as yet been made in Austria to organize any kind of military balloon service.

Submarine Mining.

Submarine mining and torpedo warfare is considered a naval service in Austria, and is exclusively left to the Navy. There is a torpedo school at Pola.

Railway Corps.

The Railway and Telegraph Corps is in Austria a distinct special service. There is a Railway and Telegraph Regiment, a full account of which has already been given in the Journal, No. CXXVIII, vol. XXIX (1885), page 257.

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REVIEWS.

Fifteen Years of Naval Retirement. By Captain P. H. COLOMB, R.N. Griffin, Portsmouth, 1886. Pp. 141. Size $8\frac{1}{2}'' \times 5\frac{1}{2}'' \times 1''$. Weight under 1 lb. 2 ozs. Price 7s. 6d.

We cannot pretend to deal fully with this question so ably handled by Captain Colomb. The Army as well as the Navy cordially concur in his opinion, p. 66: "It is impossible to argue in favour of a system which should create and maintain in the minds of State servants a notion that their object in life is to quit the Service as early as possible, and with as large a pension as possible." We fear that, save in time of war, no system of promotion or retirement satisfactory to all will be forthcoming.

Letters and Despatches of Horatio Viscount Nelson, K.B. Selected and arranged by J. K. LAUGHTON, M.A. Longmans, London, 1886. Pp. 456. Size $9'' \times 6'' \times 1\frac{3}{4}''$. Weight under $2\frac{1}{4}$ lbs. Price 16s.

Drawing on Nicolas's great work, Mr. Laughton has given us a most interesting and valuable story of Nelson's professional life. We are very glad that Mr. Laughton has not yielded to that temptation to which so many modern biographers succumb—of endeavouring to show that no man is a hero to his own valet.

Night Attacks. A Treatise on Nocturnal Tactics. By Captain R. F. JOHNSON, Brigade Major R.A. Clowes and Sons, London, 1886. Pp. 191. Size $7'' \times 5'' \times 0\frac{3}{4}''$. Weight under 12 ozs. Price 5s. 6d.

Notwithstanding the determination of Frederick the Great, quoted on the first page of this book, "never to attack by night," it is quite certain that in future wars Generals may be compelled to adopt this plan of attack; and Captain Johnson has put before us a very full and valuable collection of facts, with deductions from them to guide us in the future.

Salammô of Gustave Flaubert. Englished by M. FRENCH SHELDON, Saxon, London, 1886. Pp. 421. Size $7\frac{3}{4}'' \times 5'' \times 1\frac{1}{4}''$. Weight under $1\frac{1}{4}$ lb. Price 6s. Post free.

A realistic account of the struggle between Carthage and the mercenaries.

Elementary Military Topography. By Captain J. DEMANGEL. W. Webb, York Town, Surrey. Pp. 171. Size $8\frac{1}{2}'' \times 5\frac{1}{2}'' \times 0\frac{3}{4}''$. Weight under 1 lb. Price 9s.

This is a very complete book, and the examples given at the end of the chapters are excellent. Although it is chiefly intended for beginners, it goes also somewhat beyond the matter contained in the Synopsis of the course of instruction at the R.M.C. and the Syllabus for the examination of Officers for promotion.

Military Sketching made Easy and Military Maps Explained. By Captain H. D. HUTCHINSON, B.S.C., Garrison Instructor. Gale and Polden, Chatham. Pp. 196. Size $7\frac{1}{2}'' \times 5'' \times 0\frac{3}{4}''$. Weight under 12 ozs. Price 4s. Post free.

The Guide to obtaining a Hythe Certificate. By Captain R. W. P. LODWICK, Gloucester Regiment. Gale and Polden, Chatham. Pp. 276. Size $5\frac{1}{2}'' \times 4\frac{1}{4}'' \times 0\frac{3}{4}''$. Weight under 8 ozs. Price 3s. 6d. Post free.

Guide to Official Letter Writing, Orders, &c. By an Army Schoolmaster. Gale and Polden, Chatham. Pp. 105. Size $7\frac{1}{2}'' \times 5'' \times 0\frac{1}{2}''$. Weight under 6 ozs. Price 1s. 6d. Post free.

These books, all of the series being issued by Messrs. Gale and Polden, will be found of service in preparing for examinations, but the schoolmaster's little work is by no means the least valuable.

